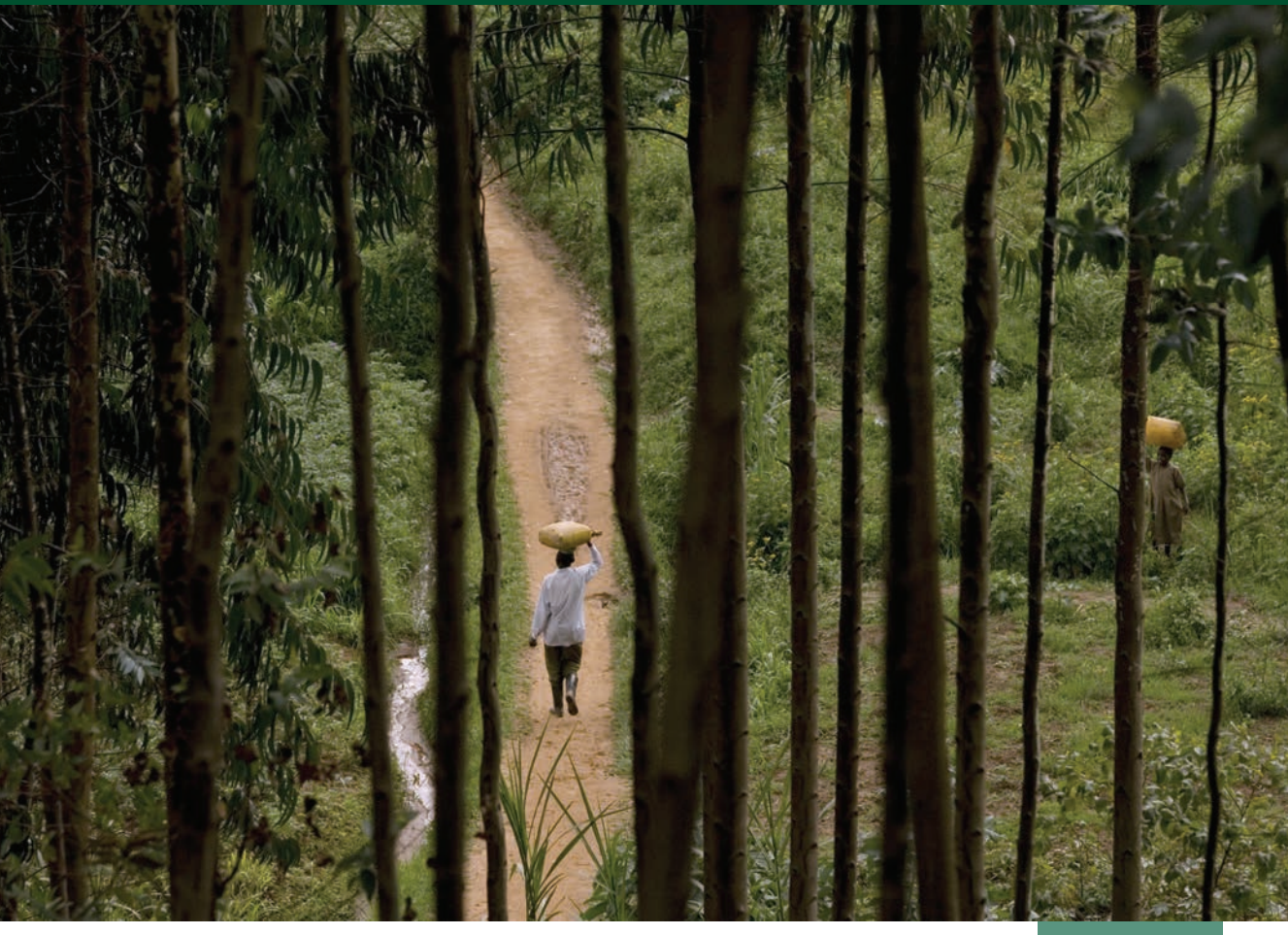
Food and Agriculture Organization of the United Nations

National socioeconomic surveys in forestry

Guidance and survey modules for measuring the multiple roles of forests in household welfare and livelihoods



CIFOR IFRI WORLD BANK GROUP LSMS Living Standards Measurement Study PROFOR

FAO FORESTRY PAPER

179

ISSN 0258-6150

SHOUT
SHARE
IT

National socioeconomic surveys in forestry

FAO
FORESTRY
PAPER

179

Guidance and survey modules for measuring the multiple roles of forests in household welfare and livelihoods

by
Riyong Kim Bakkegaard
Arun Agrawal
Illias Animon
Nicholas Hogarth
Daniel Miller
Lauren Persha
Ewald Rametsteiner
Sven Wunder
Alberto Zezza

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
and
CENTER FOR INTERNATIONAL FORESTRY RESEARCH
and
INTERNATIONAL FORESTRY RESOURCES AND INSTITUTIONS RESEARCH NETWORK
and
WORLD BANK

Rome, 2016

Recommended citation: FAO, CIFOR, IFRI and World Bank. 2016. *National socioeconomic surveys in forestry: guidance and survey modules for measuring the multiple roles of forests in household welfare and livelihoods*, by R.K. Bakkegaard, A. Agrawal, I. Animon, N. Hogarth, D. Miller, L. Persha, E. Rametsteiner, S. Wunder and A. Zezza. FAO Forestry Paper No. 179. Food and Agriculture Organization of the United Nations, Center for International Forestry Research, International Forestry Resources and Institutions Research Network, and World Bank.

Cover photo: People rely on many forest products for their livelihoods (Burera village, Rwanda). © FAO/Giulio Napolitano

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO), CIFOR, IFRI or World Bank, concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO, CIFOR, IFRI or World Bank, in preference to others of a similar nature that are not mentioned. The views expressed in this information product are those of the author(s) and do not necessarily reflect the views or policies of FAO, CIFOR, IFRI or World Bank.

© FAO, CIFOR, IFRI, World Bank, 2016

ISBN 978-92-5-109438-9 (FAO)

FAO encourages the use, reproduction and dissemination of material in this information product. Except where otherwise indicated, material may be copied, downloaded and printed for private study, research and teaching purposes, or for use in non-commercial products or services, provided that appropriate acknowledgement of FAO as the source and copyright holder is given and that FAO's endorsement of users' views, products or services is not implied in any way.

All requests for translation and adaptation rights, and for resale and other commercial use rights, should be made via www.fao.org/contact-us/licence-request or addressed to copyright@fao.org.

FAO information products are available on the FAO website (www.fao.org/publications) and can be purchased through publications-sales@fao.org.

Contents

Foreword v
Acknowledgements vi
Acronyms and abbreviations vii

1. Introduction 1
Rationale and objective of the sourcebook 1
Expected users and scope: how to use the sourcebook 4

2. Background to including forest-related questions in household surveys 11
State of play in household surveys 11
Forests and livelihoods 14
Scaling up subnational surveys to the national level – dealing with the challenges 24
How to use the forestry modules 25

3. Measuring the role of forests and trees in household welfare and livelihoods 29
Definitions 29
Methods used in data collection 33
Some data-collection issues 35

4. Collecting household welfare data through the forestry modules 39
Separate forestry modules 41
Integrated modules: adding forestry aspects to pre-existing Living Standards Measurement Study surveys 50

5. Operationalizing the forestry modules 57
Field-testing 57
Scope, focus and limitations of data collection 58

6. Conclusions 63

References 65

Annex A. Definitions 77

Annex B. Forestry modules 83

Annex C. Additional modules/templates for non-LSMS-type surveys 115

Annex D. Integrated forestry modules 127

Annex E. Codebook 135

Annex F. Data sources and links 163

Annex G. Main results of field tests 167

Tables

1 Forestry module themes and indicators 6

2 Forests, trees and environment: categorization of vegetation systems with variable management intensity 29

3 Details of field tests in Indonesia, United Republic of Tanzania and Nepal 57

Figures

1 Decision tree for forestry modules 27

2 Coverage of forest, tree and environmental incomes and their origin in the forestry modules and other LSMS-ISA modules 32

Boxes

1 Survey types 2

2 Structure of forestry modules for LSMS-type surveys 40

3 Additional modules and templates for non-LSMS-type surveys 41

Foreword

Forests and trees contribute in multiple ways to reducing food insecurity, supporting sustainable livelihoods and alleviating poverty. As FAO's *State of the World's Forests 2014* (*SOFO 2014*; FAO, 2014a) shows, for about one-third of the world population wood is the primary or only energy source, demonstrating the relevance of "wood security" in food security in many regions. Forests and trees also provide affordable shelter and a variety of environmental services that contribute to household welfare and livelihoods, especially for the poorest people in many regions, but the nature and scale of this contribution are still little understood.

SOFO 2014 assessed existing data on socioeconomic benefits with a focus on people – the forest dwellers. However, the assessment found that current approaches for measuring the socioeconomic benefits from forests are often limited due to the lack of consistent and reliable data. As a consequence, forests' role in global development remains underestimated and in some subsectors invisible, preventing optimal consideration of forest production and consumption benefits in policy-making for social welfare. National household surveys on forest contributions to living standards can result in more accurate estimations of forest value and rural living conditions. In the context of the 2030 Agenda for Sustainable Development, better socioeconomic data on forests can contribute to the achievement of the Sustainable Development Goals through more targeted and cost-effective policies.

Aiming at a landmark contribution to data collection on the socioeconomic benefits from forests, this publication, led by the FAO Forestry Department and developed over three years of collaborative work with the Center for International Forestry Research (CIFOR), International Forestry Resources and Institutions (IFRI), and the World Bank's Living Standards Measurement Study (LSMS) and Program on Forests (PROFOR), presents a set of survey modules on forest and wild products. The modules are primarily discussed in relation to LSMS-type surveys, but they are applicable to a wide range of multi-topic household surveys and should allow the generation of precise, comparable and reliable data.

I hope that countries and other institutions working in this field will use the modules and guidance in this sourcebook to help close the information gap on the multiple relationships between household welfare and forests, enabling better consideration of forests' role in sustainable development strategies and policies.

René Castro-Salazar
Assistant Director-General
FAO Forestry Department, Rome

Acknowledgements

National socioeconomic surveys in forestry: guidance and survey modules for measuring the multiple roles of forests in household welfare and livelihoods was prepared under the coordination of Illias Animon, Forestry Officer (Economics), and overall guidance and technical supervision of Eva Muller, Director, and of Thaís Linhares-Juvenal and Ewald Rametsteiner, Senior Forestry Officers, FAO Forestry Policy and Resources Division.

This publication was made possible through financial contributions from CIFOR, UK Aid, FAO (including FAO-Finland programme and the Criteria and Indicators project funded by the German Federal Ministry of Food and Agriculture), IFRI and donors to PROFOR and LSMS-ISA (including the Bill and Melinda Gates Foundation).

Guidance from the steering group members below, and inputs from Aske Bosselmann, Alessandra Garbero, Martha Riggott, Laura Russo, Carsten Smith-Hall, Thorsten Treue and Yuan Zheng are gratefully acknowledged. Contributions are also acknowledged from Carola Fabi, Monica Madrid Arroyo and Dalisay Maligalig for peer review; Flavio Bolliger, Anne Branthomme, Josefine Durazo, Christine Holding, Sooyeon Jin, Panagiotis Karfakis, Arvydas Lebedys, Yanshu Li, Juan Carlos Muñoz, Marco Piazza, Dominique Reeb, Priya Shyamsundar and Rebecca Tavani for their input; Arun Agrawal, Nicholas Hogarth and Alberto Zezza for field tests; Indah Waty Bong, Albina Chuwa, Willy A. Daeli, Firmus P. Juandi, Noah Kamasho, Birendra Karna, Emilian Karugendo, Emmanuel Msoffe, Pascas and the enumerators, Lauren Persha and Kharisma Tauhid for on-the-ground implementation; and Marcelo Rezende for supporting the tablet surveys in Nepal.

Thanks also to Suzanne Lapstun and Jessica Mathewson for supporting the publication process and co-publishing agreement; Caroline Lawrence for copyediting; Kate Ferrucci for design and layout; James Varah for proofreading; Patricia Tendi for final reviews; lslam Abdelgadir, Giulia Barbanente and Angela Bernard for editorial input; Michela Mancurti and Susy Tafuro for administrative support; and Maria De Cristofaro for communication support.

STEERING GROUP (alphabetical order after FAO)

FAO: Illias Animon, Thaís Linhares-Juvenal, David Morales, Anssi Pekkarinen, Ewald Rametsteiner and Adrian Whiteman
CIFOR: Nicholas Hogarth and Sven Wunder
IFRI: Arun Agrawal, Heather McGee, Pete Newton and Lauren Persha
World Bank: Gero Carletto and Alberto Zezza (Living Standards Measurement Study) and Werner L. Kornexl, Daniel Miller, Stefanie Sieber and Sofia Elisabet Ahlroth (Program on Forests)

AUTHORS (alphabetical order after first author)

Riyong Kim Bakkegaard, Arun Agrawal, Illias Animon, Nicholas Hogarth, Daniel Miller, Lauren Persha, Ewald Rametsteiner, Sven Wunder and Alberto Zezza.

Acronyms and abbreviations

CBFM	community-based forest management
CIFOR	Center for International Forestry Research
DFID	Department for International Development (United Kingdom)
FAO	Food and Agriculture Organization of the United Nations
FGD	focus group discussion
GDP	gross domestic product
GFCF	gross fixed capital formation
GPS	global positioning system
HS	Harmonized System codes (World Customs Organization)
IFRI	International Forestry Resources and Institutions
ILUA	Integrated Land Use Assessment
IPCC	Intergovernmental Panel on Climate Change
ISIC	International Standard Industrial Classification (UN Statistics Division)
IUCN	International Union for Conservation of Nature
KII	key informant interview
LSMS	Living Standards Measurement Study (World Bank)
LSMS-ISA	Living Standards Measurement Study – Integrated Surveys on Agriculture (World Bank)
MA	Millennium Ecosystem Assessment
MIP	most important product
NAFORMA	National Forestry Resources Monitoring and Assessment (United Republic of Tanzania)
NFMA	National Forest Monitoring and Assessment (FAO)
NGO	non-governmental organization
NSO	national statistical office
NTFP	non-timber forest product
NWFP	non-wood forest product
PEN	Poverty Environment Network (CIFOR)
PES	payment for environmental services
PRA	participatory rural appraisal
PROFOR	Program on Forests (World Bank)
REDD+	Reducing Emissions from Deforestation and Forest Degradation and conservation, sustainable management of forests, and enhancement of forest carbon stocks (UNFCCC)
SEEA	system of environmental–economic accounting
UNFCCC	United Nations Framework Convention on Climate Change

Poles used for home construction (United Republic of Tanzania).

© N. KAMASHO

1. Introduction

RATIONALE AND OBJECTIVE OF THE SOURCEBOOK

Forests play important provisioning and supporting roles in the livelihoods of rural households (Byron and Arnold, 1999; Sunderlin *et al*., 2005) and many of those who live in extreme poverty are to some degree reliant on forests for their livelihood. Products from non-cultivated ecosystems such as natural forests, woodlands, wetlands, lakes, rivers and grasslands can be a significant income source for rural households, providing energy, food, construction materials and medicines both for subsistence and cash uses. Evidence from seminal studies on the use of these environmental resources (e.g. Cavendish, 2000), shows that the contribution of forest and other environmental resources to household income accounts is significant. Recent comparative evidence suggests that forest and environmental income contributes 28 percent of total income to households in or near forests (Angelsen *et al*., 2014). More than 750 million people live in areas of low tree densities and rely on the surrounding forest and wild resources (Shepherd, 2012); a recent study by IFAD (2011) has put the number of forest-reliant people at 1.1–1.3 billion, mostly in developing countries. Forest products contribute to the shelter of at least 1.3 billion people, and about 2.4 billion cook with woodfuel (FAO, 2014a).

Given the probable importance of forests to the well-being of rural populations in many contexts around the world, the collection of data on household living standards for policy development and evaluation should include questions regarding household reliance on forest and wild products and the nature of this reliance. In the last decade, an increasing awareness of the importance of forest income in the livelihoods of poor people, especially those living in rural areas, has emerged and led to large-scale cross-national studies such as the Center for International Forestry Research (CIFOR) Poverty Environment Network (PEN; www.cifor.org/pen) and the Program on Forests (PROFOR) Poverty-Forests Linkages Toolkit (http://www.profor.info/node/3). Indeed, systematic comparisons of human dependence on forests and environmental resources have been challenging as research to date has primarily comprised case studies using various methodologies. The availability of such data at national level is also often limited and the contribution of forestry to gross domestic product (GDP) is often included with agriculture and fishing because data on forestry are sparse. Moreover, data on the use of forest products by households are not usually captured through household surveys. Collaborating with public organizations undertaking such surveys on an aggregate scale is thus one important way forward (FAO, 2014a). There are several advantages to rolling out a survey on a national scale. The sheer volume of respondents and data points gathered in a national survey can mean that data form a stronger evidence base for policy interventions. Moreover, the systematization of data collection at national

level will lead to regular and frequent collection and allow the monitoring or tracking of these resources. Finally, the national approach ensures that data are collected even from non-forested areas or forested areas with little resource use. Indeed, these areas may often fall within the gaps of forest research, but are nonetheless important to complete the picture of forest resource use in any country.

Standard methodologies that could consistently measure the welfare contribution of forests and environment to household income and poverty alleviation could eventually ensure that the true value of forests and other environmental products is captured in a range of standard and important livelihood metrics, such as national poverty measurements and GDP. However, several measurement and data-collection challenges are associated

BOX 1

Survey types

National statistical offices (NSOs) conduct a variety of household surveys, which differ in scope and objectives. Some household surveys have the objective of collecting data for specific purposes such as the calculation of employment statistics (Labour Force Surveys), the calculation of consumer price indices and the compilation of national accounts (Household Budget Surveys, Household Income and Expenditure Surveys).

"Multi-topic household surveys" generally refer to household surveys that (as the phrase suggests) collect data on numerous topics in combination, and can therefore be used to analyse well-being in a broader perspective and context. These come under different names and designs, including and not limited to:

- Living Standards Measurement Study, and its Integrated Surveys on Agriculture (LSMS-ISA) variant;
- Surveys of Living Conditions;
- Employment and Welfare Surveys;
- Poverty Monitoring Surveys; and
- Integrated Household Surveys.

While the discussion in this sourcebook can be useful to practitioners involved in designing all types of multi-topic household surveys, the report has been written with explicit reference to the multi-topic surveys usually associated with the World Bank LSMS programme. Other examples of guidebooks developed for the LSMS programme and focusing on specialized sectors include:

- *Design and implementation of fishery modules in integrated household surveys in developing countries* (Béné *et al.*, 2012);
- *Improving household survey instruments for understanding agricultural household adaptation to climate change: water stress and variability* (Bandyopadhyay *et al.*, 2011); and
- *Energy policies and multitopic household surveys guidelines for questionnaire design in living standards measurement studies* (O'Sullivan and Barnes, 2006).

See also: http://www.worldbank.org/lsms.

with this goal. Some of the main challenges are: (1) the trade-off between implementing a detailed survey and capturing enough households in the sample, to make analysis of forest dependence and use meaningful and relevant; (2) related to this, capturing use of low incidence or highly specialized forest products, due to factors such as seasonality; (3) that forest products use can often be illegal or informal in nature, and respondents may be uncomfortable reporting openly on their forest use via a household survey; and (4) that forests provide several non-market, indirect or less overtly tangible services that are difficult to measure accurately through standard market-based approaches, but nevertheless provide support for livelihoods (PROFOR, 2008). Despite these challenges, working towards standardized data collection on the contribution of forests to household welfare is important, because improved specificity of data at national level can greatly improve the knowledge base around the role of forests and natural environments in rural poverty alleviation, and can better inform policy debates, programming and related decision-making.

However, to develop nationally representative figures on the role of forest and wild products in households throughout countries requires a more systematic approach across vegetation/forest types, ecoregions and different factors influencing the levels of resource use (e.g. population density, ethnicity, forest cover, proximity to roads). As a result, FAO along with CIFOR, IFRI (International Forestry Resources and Institutions), and the World Bank LSMS (Living Standards Measurement Study) and PROFOR programmes came together with the objective of developing specialized modules on forest and wild products (herein referred to as forestry modules) to fill current information gaps concerning the relationship of forest and wild products to household well-being.

The work involved two phases. In phase one, which ended in January 2014, three reports were produced: (1) a review of the coverage of forest-related socioeconomic issues in selected surveys (Russo, 2014); (2) a micro-data analysis of selected socioeconomic surveys (Riggott, 2014); and (3) an analysis of CIFOR's Poverty Environment Network (PEN) survey (Bakkegaard, 2013). In phase two, which ended in April 2016, standard and expanded survey questionnaires on forest and wild products were developed and field-tested in three different country contexts (including testing of the tablet version): Indonesia (Bong *et al*., 2016), United Republic of Tanzania (Persha, 2015), and Nepal (Karna, 2015). Successive adaptations to the modules were made based on the experiences gathered in each round of field tests.[1]

This sourcebook builds on the results from these field tests to present a set of survey modules on forest and wild products that can be used to provide information on the socioeconomic contributions of forests and non-forest environments to household welfare and livelihoods. While these modules are primarily discussed in relation to the LSMS surveys, they are applicable to a wide range of multi-topic household surveys (see Box 1 for explanation of surveys). It provides guidance on how to employ the various components of the forestry modules, as well as an overview of the current state of play in

[1] The forestry modules were tested in Asia (Indonesia and Nepal) and Africa (United Republic of Tanzania). Care has however been taken to make them useful for different continents, based on the experience of the authoring institutions. Users are encouraged to further adapt the modules to suit local circumstances and conduct field tests before implementing them to scale.

forest-related surveys and literature on the various dimensions filled by forests and wild products in household welfare and livelihoods. It also provides recommendations on how to customize the modules according to policy and research needs of other interested users.

EXPECTED USERS AND SCOPE: HOW TO USE THE SOURCEBOOK

With the objective of strengthening national-level data collection on forest and wild products, the sourcebook and forestry modules are targeted primarily at national statistical offices (NSOs). NSOs are usually responsible for the implementation of national household socioeconomic surveys, including LSMS surveys and other living conditions surveys that focus on household welfare and livelihoods in their respective countries. Forest-rich developing countries may be particularly interested in generating more accurate measurements of the contributions that forests and other non-cultivated ecosystems make to the national economy and people's livelihoods.

Other target users include research organizations, donors, other government agencies, and non-governmental organizations (NGOs) interested in collecting comparable data on the use of forest and wild products by households and local communities, either at the national scale or at other levels of aggregation.

The survey modules will contribute to bridging the existing data gaps in estimation of forest subsector value addition while compiling national economic accounts and satellite accounts (system of environmental–economic accounting – SEEA). Specifically, the survey will enhance the availability and quality of forestry-related data: gross output, intermediate consumption (the key variables for estimating the value addition); fixed assets and changes in stock needed for estimation of gross fixed capital formation (GFCF) or investment in GDP; income from and expenditures of forestry activities; and key aspects for measuring people's well-being as regards employment, wages and salaries. Regarding the SEEA, the survey can be instrumental for the estimations of physical flows and monetary accounts, including intra-unit flows. As it can account for the output used by the same economic unit as part of its final consumption in the SEEA, the sourcebook is particularly relevant to own-account production use, because it provides for the quantification of production for self-consumption within the household unit. Information from the survey will help to isolate the forest subsectoral contributions and support policy-maker estimates, by analysing the value addition and real growth rates by subsectors.

Table 1 provides an overview of the themes and corresponding sections in the forestry modules and outlines the indicators used to investigate each theme. The household and community questionnaires in the forestry modules are developed to collect information on the welfare contribution of forest and wild products to rural households through their provision of goods and services. They also focus on the contributions from wild products, which essentially refer to products from non-planted low-input systems in forest and non-forest environments (see Section 3 and Annex A of this sourcebook for definitions, and Figure 2, page 32, for coverage of products in the modules). The inclusion of wild products is important, as products from such non-forest environments can in some cases make a greater contribution to household incomes than forests (e.g.

Pouliot and Treue, 2013). This also covers the collection of forest or wild products in non-forest tree-based environments, although the planting of tree crops and volume of crop harvest is included in the agricultural module of LSMS studies (e.g. Section 7 of the agricultural module; World Bank, 2015a). Furthermore, excluded from this survey are harvests obtained from cultivated agricultural products (crops, livestock, aquaculture, etc.; World Bank, 2015a) or products extracted from capture fisheries, for which data in the LSMS are already collected under the agricultural and fisheries modules (e.g. Module F: Fisheries Output; World Bank, 2015b).

The sourcebook is structured as follows. Section 2 gives the background of forest-related questions in household surveys. It first outlines the state of play in multi-topic household surveys with a focus on LSMS-type household surveys, as well as the important roles of forest and wild products in rural livelihoods and household welfare, diversity of forest users, and issues of access, rights and governance. An overview of scaling up household surveys to national level is provided and, finally, guidance given on how to use the forestry modules for LSMS-type surveys and for other users.

Section 3 gives an overview on how to measure contributions to the household and roles of forests and wild products. Definitions of forest and wild products are outlined and then the various methods used in the forestry modules are discussed. Issues concerning the measurement of forest and wild product data, such as difficult concepts, seasonality and recall, distinguishing origin of products, measurement units and prices are discussed.

Section 4 presents the forestry modules. Fifteen thematic areas representing the various contributions of forest and wild products to household welfare are reviewed and each thematic area guides the reader to relevant sections of the modules. In addition to the forestry modules, additional questions have been developed to be appended to existing LSMS household and community surveys. Example questions from this integrated survey have been provided using existing LSMS-ISA household and community surveys that were implemented in two of the LSMS-ISA countries, Malawi and the United Republic of Tanzania.

Operationalization of the surveys is covered in Section 5. Details of the design of field-testing in three sites – Indonesia, Nepal and United Republic of Tanzania – are outlined. Importantly, the scope, focus and limitations of the forestry modules are also presented, including enumerator training and quality control, and use of tablet devices in the field. Section 6 summarizes the overall conclusions.

TABLE 1
Forestry module themes and indicators

Theme	Variables	Indicators (section-specific)	Community		Household		
			Standard	Extended	Standard	Extended	Non-LSMS alternative
Income from forest and wild products	• Forest and wild product Income (cash and subsistence; raw and processed) • Reliance on forest income	• Value of income, net of input costs • Value of forest income/ value of total household income			A1: Income, Questions 1.11, 1.14, 1.24, 1.27		
Other forest-related income sources	• Other income	• Value of income • Value of in-kind benefits			A2: Income, Questions 2.4, 2.9, 2.11		
Food and nutrition	• Diversity of products	• Quantity (volume) of product consumed • Value of product consumed	B: Most important forest and wild products A: Seasonal calendar		A1: Income, Questions 1.8, 1.21		
Employment/ business benefits (forest-related)	• Employment/ business income	• Value of income, gross and net of input costs					A3: Wage income, Question 3.8, A4: Business income, Questions 4.3, 4.4
Forest-related assets	• Assets • Asset importance	• Quantity and value of assets • Level of asset use (1 to 5)					A5: Forest-related assets, Questions 5.3, 5.5, 5.6

Table 1 continues on next page

Table 1 continued

Theme	Variables	Indicators (section-specific)	Community		Household		
			Standard	Extended	Standard	Extended	Non-LSMS alternative
Energy source	• Type of product (fuelwood or charcoal) • Importance of energy source • Frequency of reliance • Access to product	• Quantity used and sold • Value used or sold, gross and net of input costs • Frequency of use (0 never to 4 always) • Level of access (1 very easy to 5 very difficult)			A1: Income, Questions 1.6, 1.8, 1.9, 1.11, 1.14, 1.19, 1.21, 1.22, 1.24, 1.27 B2: Forests and energy		
Health	• Medicinal plants • Sourcing • Origin of product • Availability of medicinal plants • Frequency of reliance • Response to lack of medicinal plants • Preference for medicinal plants or modern medicine	• Quantity used and sold • Value used or sold, gross and net of input costs • Source (1 to 3) • Land type (1 to 3) • Availability (1 increased 2 decreased) • Frequency (0 to 4) • Response (1 to 6) • Preference (1 modern, 2 medicinal plants)			A1: Income, Questions 1.6, 1.8, 1.9, 1.11, 1.14, 1.19, 1.21, 1.22, 1.24, 1.27 B3: Forests and health		
Construction and fibre products	• Product type • Origin of product • Access to product	• Quantity used and sold, by product • Value used or sold, gross and net of input costs • Land type (1 to 3) • Level of access (1 very easy to 5 very difficult)			A1: Income, Questions 1.6, 1.8, 1.9, 1.11, 1.14, 1.19, 1.21, 1.22, 1.24, 1.27 B4: Forests and construction		
Other products from forests/ trees	• Type of product	• Quantity used and sold, by product • Value of product, gross and net of input costs			A1: Income, Questions 1.6, 1.8, 1.9, 1.11, 1.14, 1.19, 1.21, 1.22, 1.24, 1.27		

Table 1 continues on next page

Table 1 continued

Theme	Variables	Indicators (section-specific)	Community		Household		
			Standard	Extended	Standard	Extended	Non-LSMS alternative
Regulating and supporting environmental services	• Type of practice • Implementer of PES programme • Perception of climate change	• Number of years of participation in PES programmes • Area under conservation (if applicable) • Value of in-kind or cash benefits to household/ community for participation in PES programmes • Implementer (1 to 4) • Qualitative (open-ended)	D1 Practice: Community benefits from forest-related land use or management programmes	F1: Perceptions of climate change	A2: Other forest-related income, Questions 2.4, 2.9, 2.11		
Extension services	• Type of service • Implementer of service	• Receipt of service (1 yes, or 2 no) • Implementer (1 to 4)	D2 Support: Community benefits from forest-related land use or management programmes				
Forest changes and clearance	• Forest change • Forest clearance • Afforestation • Purpose of afforestation • Drivers of clearance	• (1 increased, 2 decreased) • Reason (1 to 14) • Number of hectares cleared • Distance (km) to cleared forest • Number of trees planted • Reason (1 to 20) • Reason (1 to 7)				D1 and D2: Forest changes and clearance	
Shocks and coping strategies	• Type of shock • Severity of shock • Role of forest products in recovery • Type of forest product	• Experienced (1 yes, 2 no) • Rank (1 to 3) • Use of forest product (1 yes, 2 no) • Recovery (0 to 5) • Use (1 sold 2 consumed 3 both) • Source (1 to 9)			C1 and C2: Food shortage, Shocks and crises		

Table 1 continues on next page

Table 1 continued

Theme	Variables	Indicators (section-specific)	Community		Household		
			Standard	Extended	Standard	Extended	Non-LSMS alternative
Cross-cutting themes							
Governance, access, tenure	• Access to forest • Land tenure • Type of rules • Compliance to rules • Enforcement • Type of penalties	• Physical distance (km) and time (min) to forest • Tenure (1 to 3) • Type (informal or formal) • Respect (0 to 4) • Enforcement agent (1 to 7) • Type (1 to 7) • Number of penalties issued in past 12 months	COM_Module B: Most important products, Questions 3 and 4	Extended COM_ Module E1: Forest institutions; Module E2: Enforcement and penalties	B1: Forest resource base, Questions 1.1a, 1.1b B2: Forests and energy, Questions 2.8, 2.9 B3: Forests and health, Questions 3.3, 3.4 B4: Forests and construction, Questions 4.4, 4.5 D2: Forest clearance, Questions 2.15, 2.16		A3: Forest-related wage income, Question 3.2
Household-level characteristics	• Gender • Age • Education • Labour	• Binary (0 male, 1 female) • Years • Years of education • Hours invested in collection/ processing			A1: Income, Questions 1.2, 1.3, 1.5, 1.16, 1.17, 1.18		
Origins of products	• Origin	• Land type (1 to 3)	B: Most important forest and wild products, Question 2		A1: Income, Question 1.4 C2: Shocks and crises, Question 2.6 D2: Forest clearance, Question 2.13		

Timber (mainly Borneo ironwood and Shorea *sp.) was collected and used to build houses or to sell for cash (Indonesia).*

© N. HOGARTH

Woman and her baskets. The basket materials were collected from the forest (Indonesia).

© I.W. BONG

2. Background to including forest-related questions in household surveys

STATE OF PLAY IN HOUSEHOLD SURVEYS

Living Standards Measurement Surveys

The Living Standards Measurement Study (LSMS) survey programme was established in 1980 by the World Bank to systematize the collection of household-level data. The general objectives are to provide adequate data on household living standards in developing countries, especially among poor people, for the development and evaluation of policies and social programmes that impact on household living standards. Over the years, the surveys have become a widely used tool for collecting household-level information for policy needs and have been used in calculations of poverty. Surveys are ideally carried out every three to five years, but the frequency of implementation and survey components differs among countries.

LSMS surveys are generally representative of the national population, as well as of urban and rural strata, major macro-regions, or in some cases of lower administrative levels (e.g. districts in Malawi). They are generally administered by a country's NSO and hence the survey may take different names in different countries, often with no specific reference to the LSMS.

One key feature of LSMS surveys is that they are multi-topic. That is, they integrate modules on different aspects of household livelihoods, thus allowing an integrated analysis of household livelihood strategies. Typically, LSMS surveys include modules on household demographics, housing conditions, education, health, wage employment, non-farm household enterprises, agriculture, consumption expenditures and asset ownership. The LSMS surveys are not fully standardized between countries but leave room for countries to adapt to their national circumstances (Grosh and Glewwe, 2000). Additional modules that are often included in national surveys are anthropometric information, subjective poverty, food security, shocks and coping strategies, vulnerability, credit, savings, social capital and more.[2]

The existing environmental modules in the LSMS surveys examine households' general environmental priorities for action. They include modules on household attitudes towards

[2] See http://iresearch.worldbank.org/lsms/lsmssurveyFinder.htm for a full list of available LSMS modules in existing LSMS datasets.

the environment and perceptions of urban air quality, water use, sanitation and fuel use, as well as contingent valuation of improved water and sanitation service provision and urban air quality (Whittington, 2000). These environmental modules do not consistently quantify incomes or other benefits from forests, wild products or ecosystem services.

In 2008, the LSMS Integrated Surveys on Agriculture (LSMS-ISA) were developed, with the aim of strengthening the representativeness of existing agricultural data, which included contributions of agriculture, livestock and tree crop plantations to income and subsistence consumption in households. Through the development of robust nationally representative panel household surveys focusing on agriculture, serious measurement problems, such as inconsistent time allocation to collecting agricultural data, institutional and sectoral isolation, and methodological weakness, could eventually be overcome. This greatly benefited our knowledge of welfare contributions from agriculture (World Bank, 2011; LSMS-ISA, 2011).

However, between the environmental modules and the Integrated Surveys on Agriculture, inclusion of data potentially relating to forests were limited to 12 summary forestry-related variables: fuel for cooking, fuelwood expenditure, material for outer walls, roof material, flooring material, source of lighting, source of heating, area of forest, number of trees, fuelwood collection, forest products and forestry income (FAO, 2013b; Russo, 2014).

The basic reference of LSMS-type survey design comes from Grosh and Glewwe (2000). In recent years, the LSMS has developed a number of sourcebooks for questionnaire development on specific topics, such as climate change (McCarthy, 2011; Bandyopadhyay *et al.*, 2011), conflicts (Brück *et al.*, 2013), fisheries (Béné *et al.*, 2012), justice (Himelein *et al.*, 2010) and energy (O'Sullivan and Barnes, 2006). This sourcebook is the most recent addition to the series. The purpose of the forestry modules is similar to the fisheries modules: to better capture an important, yet thus far under-researched, income-generating source in the household economy.

Agricultural census

In 1950, countries began collecting internationally comparable data on agriculture under the FAO World Programme for the Census of Agriculture.[3] With the intention that the census is implemented at least once every ten years, it uses common methodology, definitions and concepts of agriculture. The objective of the census is to collect comprehensive data on the structural parameters of agriculture in a country (e.g. number and area of farms by size, land tenure and use, crops and agricultural inputs, number of livestock). Data on economic, social and environmental indicators might also be collected, but coverage of forest is limited to area of forests and woodlands, number of trees as permanent crop, plantations of forest trees, area of forest tree nurseries, wood products, non-wood products, fuelwood/charcoal, forestry income and management. The Agricultural Census is owned by the countries, therefore FAO support is not part of its implementation (FAO, 2013a; Russo, 2014).

[3] World Programme for the Census of Agriculture, http://www.fao.org/economic/ess/ess-wca/en/.

National land-use surveys

Since 2000, FAO has been providing support to Member Nations for strengthening capacity for long-term forest monitoring, including socioeconomic monitoring. The Integrated Land Use Assessment (ILUA) in Zambia, carried out between 2005 and 2008, was one of the first programmes to implement socioeconomic surveys in addition to assessments of land use. However, surveys were not standardized and used semi-structured interviews, which resulted in highly variable levels of reliability of answers. Similarly, FAO's National Forest Monitoring and Assessment (NFMA) programme in the Gambia, implemented from 2009 to 2010, used semi-structured interviews during implementation of socioeconomic surveys at community and household levels.

In 2009, the FAO-Finland Sustainable Forest Management in a Changing Climate Programme aimed at strengthening countries' capacity in collecting and analysing forest information through the design and implementation of biophysical forest inventories, forest-related socioeconomic data collection (household, key informant, focus groups and institutions) and related software development[4] at FAO headquarters (FAO, 2014b). It was initiated in five pilot countries (Ecuador, Peru, United Republic of Tanzania, Viet Nam and Zambia). United Republic of Tanzania, through its National Forestry Resources Monitoring and Assessment (NAFORMA) programme, has implemented its own socioeconomic survey covering household food security and risk, household income, forest products and services, participation in organizations and forest users' groups, and forest governance. Countries can also have specific national land use surveys.

CIFOR Poverty Environment Network

CIFOR's PEN global-comparative project was the first to attempt to use a consistent methodology to measure in a detailed manner the multiple contributions of forests and the environment in household income. Between 2004 and 2009, PEN partners (mostly PhD students) collected quarterly socioeconomic household and village data over one full year from 58 sites in 24 developing countries (Wunder *et al.*, 2014a). Standardized definitions and questionnaires quantifying both cash and subsistence incomes were used to make data comparable between sites across the developing world (Africa, Asia and Latin America). Study sites covered mostly smallholder-dominated tropical and subtropical landscapes with some access to forest resources; forest-scarce, population-dense rural areas are slightly under-represented in the global sample (Angelsen *et al.*, 2014).

The basic structure of this survey was designed to collect information on all the sources of household income, including forests and the environment, wages, business, crops, livestock and others, in order to derive the level of reliance on forest income (calculated as the proportion of total forest income in total household income). Data on household assets, forest access and forest types, and aspects of forest governance were also collected. Both household and village questionnaires were applied. Sampling of villages was done along certain gradients (forest cover, population density, proximity to

[4] Open Foris, http://www.fao.org/forestry/fma/openforis/en/, Collect Mobile http://www.openforis.org/tools/collect-mobile.html.

roads, etc.). The results are thus typically representative of a certain landscape, region or province, but not of the entire country where the study was carried out.

IFRI

International Forestry Resources and Institutions (IFRI) research methods encompass 11 survey instruments designed to collect ecological data on forests, and socioeconomic and institutional data in the surveyed forest communities based on theoretical and empirical knowledge of common-pool resources. Through the application of these research instruments over space and time, the studies aimed to collect the necessary data to test a range of hypotheses around the relationships between forest use, management and institutional structure, as well as ensuing outcomes for forest resource conditions, and social and economic outcomes within forest-dependent communities. The research instruments cover physical attributes of forests at site and household levels, demographic information on settlements and connections to markets and administrative centres, attributes of forest-user groups, institutional arrangements for forest governance and management, forest products harvested by user groups including harvesting rules and penalties, etc. (Wertime *et al.*, 2008).

PROFOR and International Union for Conservation of Nature (IUCN)

The Poverty-Forests Linkages Toolkit (PROFOR, 2010) was partly based on well-known participatory rural appraisal (PRA) techniques. It focuses systematically on forest and natural resource issues, and devises a simple way of capturing non-cash and cash incomes. From 2007 onwards it was further developed by IUCN, and used in another 23 countries in the Livelihoods and Landscapes programme. IUCN is currently developing a knowledge base that will provide a set of methodologies, tools, standards and approaches capable of systematically generating new insights on the use and reliance of humans on species and ecosystems. With a focus on forests' provisioning and cultural environmental services, the aim is to systematically collect empirical data on the benefits that households and communities derive from the direct use of species and ecosystems, in order to contribute to policy formulation (Shepherd, 2012). In addition, IUCN piloted a standard quantitative survey in 2014 to evaluate the contribution of forests and non-forest environments to households in the South Caucasus (Armenia, Azerbaijan, Georgia), Eastern Europe (Belarus, Moldova, Ukraine) and the Russian Federation (Bakkegaard, 2014).

FORESTS AND LIVELIHOODS

One of the first studies to empirically account for the share of household income from forests and the environment was implemented by Cavendish (2000) in Zimbabwe. The household survey underlying this study collected data on income from agriculture, enterprises, wage labour and environmental resources, and showed that poor households on average obtained around one-third of their income from forests and other environmental resources. The study also found that in Zimbabwe absolute environmental income rises with total income, while at the same time the environmental income share

of total household income falls. The Cavendish study was at the time much cited in the discussion of environment and poverty policies, and also served as prime inspiration to the design of the CIFOR PEN project (see page 24).

The pattern of decreasing reliance on environmental income with increasing total income has been confirmed by several other studies (e.g. Angelsen *et al*., 2014; Heubach *et al*., 2011; Jagger, 2010; Vedeld *et al*., 2007). However, it is not a universal trend. As part of the PEN studies, Uberhuaga *et al.* (2012) found that better-off households in forest-dependent communities in lowland Bolivia had both the highest total and relative forest income. Similarly in a study by IUCN in the northern temperate and boreal forests, richer households in Azerbaijan, Belarus and the Russian Federation also had higher total and relative forest incomes resulting from the high cash values of forest products in this region (Bakkegaard, 2014).

Therefore, in order to inform national policy dialogue and adequately reflect how forest and wild products contribute to household welfare and livelihoods, more forest-related aspects need to be integrated with standard national surveys.

Role of forest and wild products in household welfare and livelihoods

The role of forest and wild products in livelihoods varies among households and different periods of time. Angelsen *et al.* (2014) mention three primary roles of environmental income: (1) supporting current consumption; (2) providing a safety net in case of shocks and during crisis as well as gap-filling during seasonal shortfalls; and (3) a means to accumulate assets and provide a path out of poverty.

The first role is the supporting function of forest and environmental resources to household consumption, where forest or wild products form an important part of the household's subsistence food and farm inputs or generate household income. In a meta-study of 17 countries and including 51 cases, Vedeld *et al.* (2007) found that the average forest income contribution was the third most important, after off-farm activities and agriculture (including livestock, contributing to an average of 22 percent to household incomes. Referring to a number of recent studies, Angelsen *et al.* (2014) describe the share of forest income to be between 6 percent and 44 percent of total household income. Results from the global CIFOR study confirm the 22 percent contribution of forest income to total household income, increasing to 28 percent when other environmental income is also accounted for. Case studies confirm this (e.g. Tigray in northern Ethiopia [Babulo *et al*., 2009], and rural Nigeria [Fonta *et al*., 2011]). With such significant contributions to household incomes, not considering forest and environmental income can inaccurately represent poverty depth and severity, and potentially misdirect policies aimed at impoverished groups.

The second role played by forests is as a buffer in periods with low income or low food availability (e.g. as gap filler between crop harvest periods) and during income or assets shocks, e.g. crop failure or loss of a family member. Wunder *et al.* (2014b) provide a short review of studies that typically found forest reliance among rural households to increase after income or asset shocks: households sell additional forest products during cash and subsistence emergencies, and increase their forest product extraction when crops

fail or are expected to fail, and during weather extremes. Households are also found to increase forest product extraction, consumption and sale as a gap-filling or income-smoothing mechanism in times of temporarily low income from other sources, as an alternative to reducing their consumption. However in the same paper, Wunder *et al.* (2014b), based on the global PEN dataset, found forest product extraction as a response to income shocks to be less prominent than other shock responses (e.g. finding wage employment, selling assets, seeking help from neighbours, etc.). Only for the poorest households already specializing in forest extraction did the forest rank highest among a suite of possible responses to economic shocks.

Forests are also believed to play an important role in asset accumulation and thus act as a path out of poverty: income and savings generated from forest-based extraction can be used to accumulate assets and reinvest in more profitable income-generating activities, thus eventually lifting the household out of poverty (Angelsen and Wunder, 2003). Only a few studies can confirm this because evidence is highly context-specific, and properly documenting this requires panel data. Using datasets over four time periods in the Democratic Republic of the Congo, Bakkegaard *et al.* (2016b) found that income from bushmeat hunting was significantly correlated to livestock asset accumulation. Households with less livestock at the beginning of the study accumulated assets at a higher rate. Jagger (2012) used a two-period panel dataset to investigate forest income improvements in several areas in the Republic of Uganda and found contrasting results between areas, partly due to institutional and land-rights changes in the intermittent period of the study. In dry forest areas in South Africa at least some households engaged in informal forest activities were able to lift themselves out of poverty (Shackleton *et al.*, 2007). Moreover, ownership of land is also a form of natural capital for households, although in many cases the use and access rights prevail over any formal ownership of land (see page 33).

Role of household-level characteristics

Household-level characteristics can also be important determinants in the total amounts of forest income earned and shares of forest income, as well as types of products being extracted from the forest.

While human capital (in the form of skills) may provide better opportunities for processing of high-return forest and wild products, high educational levels are often found to lead to less forest reliance (e.g. Godoy and Contreras, 2001; Adhikari *et al.*, 2004). There are multiple reasons for this. Education gives better access to higher income-generating activities (Kamanga *et al.*, 2009; Fisher *et al.*, 2010a; Uberhuaga *et al.*, 2012), outmigration (Mamo *et al.*, 2007), and even a change in taste that leads to less demand for extractive goods and more demand for luxury purchased goods (Byron and Arnold, 1999; Vedeld, 2004).

Forest use and collection of certain forest products can differ by gender. In many cases, men are more likely to be engaged in more lucrative high-return activities or collection of commercial products (e.g. Wickramasinghe *et al.*, 1996; Cavendish, 2000; Fisher, 2004). Female-dominated forest-user groups in Latin America and East Africa collected lower-value products and less often had exclusive rights to forest use than

male-dominated user groups (Suna *et al.*, 2011). Non-timber forest product (NTFP) collection represents vital livelihood strategies for female-headed households, resulting from limited mobility to engage in other livelihood activities (e.g. Clarke *et al.*, 1996, cited in Shackleton and Shackleton, 2006), or ease of access and ability to combine collection activities with other household activities (e.g. Paumgarten, 2005). Thus it is unsurprising to find studies indicating that female-headed households have been found to be poorer than male-headed households (e.g. Adhikari *et al.*, 2004), have a significantly greater share of income from NTFPs, and in some cases rely almost entirely on forests to meet their household needs (e.g. Osemeobo, 2005). However, results from the global CIFOR PEN study show that men and women on aggregate extract quite similar values of forest and environmental products, although there is gender-specific specialization for different types of product (Sunderland *et al.*, 2014).

Household size is also an important determinant in forest use. As indicated in the PEN studies, larger households, with high worker-to-consumer ratios, indicate greater labour availability, which can be channelled towards the collection of forest and wild products, thereby resulting in higher total forest income (Uberhuaga *et al.*, 2011; Angelsen *et al.*, 2014). Other studies such as Bakkegaard *et al.* (2016b) in the Democratic Republic of the Congo found that selection into high-return forest activities such as bushmeat hunting was conditioned by labour availability; however, final outcomes (quantities) of products collected were lower. Kamanga *et al.* (2009) suggested that the lack of labour is one of the main reasons why the poorest households have the lowest absolute forest income.

Age is also a factor: younger-headed households could have both the health and opportunity available to exploit high-return activities such as timber extraction or charcoal production. On the other hand, elderly households may prefer less labour-intensive collection-based activities (compared with land cultivation) that may be free of entry barriers but often low in return; older people may also possess better knowledge of forest product distribution (de Merode *et al.*, 2004, Mamo *et al.*, 2007).

Benefits and goods from forest activities

The value of cash and subsistence incomes combined is the most frequently used indicator when assessing the importance of forest and other income from non-forest environments to the rural household economy. This value is derived from a range of benefits and goods from forest activities, some of which are described below.

Employment

Forests and trees provide employment opportunities to household members, both in formal and informal forest activities. The formal forest sector encompasses employment in forest plantations, timber mills and related enterprises, commercial handicraft production, and in the ecotourism industry. Furthermore, large-scale forest enterprises, such as commercial plantations and large timber mills, can often generate downstream employment opportunities connected to their operation and output, such as water, sanitation, electricity provision and maintenance for their operations, and roads. Other formal employment opportunities relating to the forest sector include work as forest

reserve guards, desk and field officers in state forest departments; or employment in NGOs working with forest management.

While the majority of employment in the formal forest sector will be recorded in standard household LSMS-type surveys that include employment and enterprise income, the income from employment in the informal forest sector may not be so easily captured. The informal forest sector often includes illegal forest product extraction and processing, such as organized bushmeat and charcoal trade, etc., as well as either legal or quasi-legal activities, such as collection, processing and sale of certain non-timber forest products (NTFPs). Charcoal production in forest reserves and state-owned forests is usually an illegal, yet often widely tolerated and organized, business in most countries. In Malawi, for example, the majority of rural households in some of the surveyed areas are involved in illegal charcoal production and trade (Zulu, 2010).

Food, health and medicinal plants

A substantial part of forest subsistence income is often derived from collection of food in the forest, including products such as fruits, mushrooms, roots and tubers, honey, vegetable oils, fish and bushmeat. Forest and wild products can therefore contribute to daily household consumption needs and are an important contributor to the nutrition and food security of households, especially in poor households (Angelsen *et al*., 2014). Hogarth *et al.* (2013) found bamboo shoots to be an important component in household diet. In Sudan, the fruits of the *baobab* and the desert date, or *lalob* fruit, were found to be significant for subsistence needs (Adam *et al*., 2013). Fruits and vegetables collected in the wild were found in around half of all meals among rural household in southern Nigeria (Chukwuone and Okeke, 2012), while Delang (2006) found that wild foods were more important than commercial foods among some rural communities in western Thailand.

Forests and other natural areas also provide households with medicinal plants for maintaining physical health or treating diseases. One-third of surveyed South African rural households living among different vegetation types collected plants for medicinal purposes and the use of medicinal plants diminished with higher income, where poorer households collected more than double the amount than better-off households (Cocks *et al*., 2008). Indeed, access and use of non-traditional medicine can be influenced, among other aspects, by the ability to pay for (often more expensive) modern medicine. Low educational levels, remoteness and age also influence household use of medicinal plants in rural Burkina Faso, where more than half of all illness-related incidents were treated with medicinal plants (Pouliot, 2011). Collection of medicinal plants also contributes to household cash income; for example, trade in medicinal plants is an integrated part of rural livelihood strategies and the dominant income-generating activity among some mountain-dwelling communities in Nepal (Smith-Hall and Larsen, 2003).

Other health-related aspects may include aesthetic, recreational and cultural use of the forest. Poor households, especially in urban areas, may also benefit from using forests and forest products for recreational purposes, as shown in studies in developed countries (e.g. de Vries *et al*., 2003; Nielsen and Hansen, 2007). Aesthetic and recreational use of forests by rural households in developing countries is rarely included in studies

on forest use, even though natural areas and certain trees may have cultural or religious significance, and therefore a role in household welfare. FAO (1990) provides an overview of the cultural importance of forests.

Fodder

Livestock rearing can depend substantially on fodder collected in forests and other uncultivated areas, in some parts of the world. Both Cavendish (2000) and Kamanga *et al.* (2009) found collection of fodder to be among the most important forest activities among households. In the meta-analysis by Vedeld *et al.* (2007), fodder was the third most important contributor to forest environmental income in households. Fodder can be collected and carried back to the farm, but often livestock such as goats and cattle are allowed to roam freely in uncultivated areas, such as the semi-arid regions of United Republic of Tanzania and Kenya (Trench *et al.*, 2009) or the forests of the South Caucasus (Bakkegaard, 2014). Access to forests and uncultivated areas is especially important for pastoralist people in drylands, who do not have their own plots of land but rather rely on migrating livestock through areas with fodder trees and shrubs (Maselli *et al.*, 2011). Angelsen *et al.* (2014) found that fodder makes up a larger part of non-forest environmental income than of forest income, as grazing areas are often natural grasslands and shrub areas, savannah and similar land cover types, where adequate livestock fodder is available and livestock management is more practical. In semi-arid to arid areas with open natural wooded areas, many pastoralist communities derive high forage benefits.

Energy source

Forests and trees are usually important sources of energy to rural and even urban households in developing countries. Woodfuel, in the form of either fuelwood or charcoal, is used for heating, cooking, production input (such as brickmaking) and lighting (especially where electricity is unavailable) (Heltberg, 2004). Woodfuel is one of the most important forest products collected by households. Vedeld *et al.* (2007) found that woodfuel represented one-third of total forest environmental income; only wild foods were more important. In the Eastern European countries and the Russian Federation, woodfuel collection is often needed for survival of rural households during the long and harsh winter months and comprises 27 percent of forest subsistence income (17 percent of total forest income). However, woodfuel is suspected to be substantially under-reported due to regulations surrounding its extraction that make it illegal in most of the countries studied (Bakkegaard, 2014).

Based on PEN's global dataset from 24 countries, Angelsen *et al.* (2014) found woodfuel to be even more important than wild foods, with a share of 35 percent of forest income and 8 percent of total income. The same study shows that the importance of woodfuel varies considerably across regions, representing 13 percent of forest income in Latin America, yet as much as 42 percent in Africa. On a global scale, the African continent also has by far the largest production of charcoal, which is produced in rural areas and often marketed and consumed in urban areas (Chidumayo and Gumbo, 2013).

Housing and infrastructure

Forests and trees are a source of poles and sawn planks for construction and fencing purposes, while forests as well as other types of landscapes may provide fibre, leaves, bamboo and other material for construction and thatching of roofs, walls, etc. In the CIFOR PEN analysis, construction materials and fibres represent 25 percent of forest income, with non-wood products such as leaves, thatch and bamboo being the most important materials in all tropical regions, except in Latin America, where sawn poles are the greatest contributor of value to this category (Angelsen *et al.*, 2014). Similarly, Vedeld *et al.* (2007) find grass and thatch to represent a considerable share of forest environmental income (12 percent), but also note that the value of collected timber (a 4 percent share) is believed to be substantially under-reported due to the frequently illegal nature of this forest activity. As with other subsistence uses of forest products, the use of collected material for housing is higher among lower income households. Poor rural households often depend entirely on collection of products in forests and other uncultivated areas for construction materials (e.g. Mamo *et al.*, 2007), while better-off households may be able to purchase building materials, such as tin roofs.

Regulating and supporting environmental services

The notion of environmental/ecosystem services[5] became commonly recognized with the World Resources Institute's Millennium Ecosystem Assessment (MA, 2005). Broadly defined, environmental services include provisioning services (such as production of material, food or energy products), supporting services (such as freshwater conservation, erosion control, pollination services, control of pests, provision of shade to livestock), cultural services (such as recreation and tourism), and regulating services (such as the vegetation's influence on climate systems).

In recent decades, regulating services provided by forest ecosystems have gained increasing relevance, particularly the roles of forests and trees in addressing climate change (e.g. carbon sequestration and climate regulation). Moreover, these services are often important for rural household welfare through their impact on agricultural production. But it is often difficult to assess their benefits to households in surveys, as a result of limited awareness of the various services provided (such as pollination services to agriculture by wild pollinators), and of the actual value of such non-marketed services. As forests and trees disappear, communities and households, especially those engaged in agricultural activities, may experience problems with erosion, changes in waterways and flow, and changes in local microclimate. This could create local awareness of trees and forests and their associated services, even though the term "environmental services" may not be well known.

Other than the benefits derived from forest ecosystems, rural households in some places may also obtain an income from provision of environmental services. Generally,

[5] Ecosystem services and environmental services are used interchangeably throughout the literature and are widely considered synonyms (Wunder, 2015). This sourcebook uses the term "environmental services".

rural households are being paid for a range of environmental services, mostly forest conservation for watershed protection, biodiversity conservation or carbon sequestration. The payment schemes may either be national (as in Costa Rica and Mexico) or subnational (e.g. in a water catchment). In one region in southern China, Hogarth *et al.* (2013) found such payments to be the third-largest forest income source among rural households. With the increasing attention to economic incentive mechanisms for conserving, sustainably managing and restoring ecosystems, more rural households may be expected to obtain part of their income from PES programmes (Mahanty *et al.*, 2013). Payment mechanisms associated with Reducing Emissions from Deforestation and Forest Degradation (REDD+) could also become more relevant in the economic contributions to household welfare.

Climate change adaptation and forests

Forests and adaptation are linked in two ways – "adaptation for forests" and "forests for adaptation" (Locatelli *et al.*, 2011). "Adaptation for forests" refers to the adaptation needed for forests to maintain their function. Already, climatic changes affect forests and trees; for example, increasing temperatures and reduced rainfall are decreasing tree resources and expanding the arid zones in the Sahel, Sudan and Guinea (Gonzalez *et al.*, 2012), further degrading the environmental resources available for local people. Adaptation strategies for forests involve sustaining and assisting forest ecosystems to accommodate changes dynamically as they unfold, which entails practices such as intensive removal of invasive species, surplus seed banking, and altering harvesting schedules (Millar *et al.*, 2007).

On the other hand, "forests for adaptation" refers to how forests can support livelihood systems in their adaptation to climate change. Rural households in developing countries are among those most at risk from changes in rainfall patterns, droughts and floods, rising temperatures, more intense and frequent outbreaks of pests, and increased wind, among much climate variability and changes. Forests could assist them in coping with such changes by acting as safety nets, gap fillers, and providers of local environmental services in response to climate-related fluctuations with lower food availability. For example, "trees-on-farm" systems are used to provide shade, reduce temperatures and lessen the impact of hard rainfall and winds, both for certain crops (agroforestry systems) and livestock (silvipastoral practices) (Verchot *et al.*, 2007).

There are so far very few empirical studies demonstrating the contribution of forests to adaptation strategies among rural households, due to the complexity of attributing adaptation directly to climate (e.g. in agriculture, Mertz *et al.*, 2009), as well as still-limited documentation of systematic climate change across the developing world. However, recently the PEN data have been analysed cross-sectionally together with site-specific climate data over the last 30 years (Noack *et al.*, 2015). The authors tentatively found that households hit by climate anomalies that worsen crop production conditions and lower crop income tend to rely marginally more on extractive incomes (especially from forests), as well as on more wage employment, as a strategy to smooth household income flows. These cross-sectional results need to eventually be confirmed in time-series studies. The type of socioeconomic household surveys developed here can help to achieve this.

Diversity of forest-user groups and nature of their reliance

People use and benefit from forests differently. They participate in a diverse range of forest output activities and depend on forests to varying degrees for their livelihoods. A useful typology of user groups of tropical forests has been developed by Byron and Arnold (1999) according to household relationships to forests. The first consists of people residing within a forest environment and conducting traditional forest-related activities, such as hunting and gathering. Forest are a principal livelihood activity for this group, and often socially and culturally important. The second group predominantly contains those engaging with both agriculture and extraction from forest, woodlands and other environmental areas for inputs to supplement on-farm produce. The third group encompasses people whose livelihoods are primarily based on commercial forest products and activities, such as small-scale production, processing, use and sale of forest products within families, or wage employment in large and modern forestry industries, neither of which necessarily takes place in or close to a forest. Thus, such households are less intimately linked to forests compared with the other two groups. To accommodate this diversity, the integrated modules have been developed to collect forest data among this variety of user groups (see Section 4, page 50).

Role of rights, rules and tenure regimes

Forested lands in many developing countries tend to be characterized by complex, overlapping, and in many cases contradictory (formal vs informal) tenure regimes. Moreover, the formal ownership and transfer rights over many forested lands in such countries is often held by the state, while actual use and management processes can be held by a range of devolved agencies, communities or individuals. Forested areas, which are often common-pool resources in developing countries, are often characterized by ill-defined and/or insecure tenure regimes, contested property rights, and conflicts. De facto land use often differs from formalized land rights, and open-access (e.g. communal) use of natural resources may prevail.

At the operational level, or in the everyday life of households, property rights can be divided into access rights (or "right to enter") and withdrawal rights (or "right to obtain"). Operational rules can be modified at the collective-choice level, encompassing formal and informal institutions. At this level, there is influence on who may change the operational rules, as well as the level of agreement required for a change. Here are nested the rights of management (to manipulate the resource base), exclusion (blocking stakeholders' access) and alienation (to sell or lease the above rights) (Schlager and Ostrom, 1992). Yet, even with the formal right to exclude or alienate, households or communities may still in reality be unable to exclude other more powerful users, such as logging companies. Moreover, similarly marginalized households may not have the ability to exercise their use rights due to local power structures. Therefore, a common distinction for forest use rights are between de jure rights (rights that have legal recognition by means of formal instruments) and de facto rights (informal rights, or behavioural norms that are locally understood, and may be defined or enforced by groups who use or monitor forest resources) (Schlager and Ostrom, 1992). The complexity of property and use rights is

often shaped by culture, history, legislation and other formal and informal institutions; therefore individual access to resources, i.e. the ability to gain benefits from resources, may be more important than rights to resources (Ribot and Peluso, 2003).

A household's access to forest and trees is therefore governed by an array of formal and informal rights, customs and conventions, as well as the ability to exercise these rights. In turn, the household's perceived access to forests and trees, both current and expected access in the future, influences how rural households manage resources and shapes their reliance on them. If a household does not expect to have continuous access, or is competing for the same resources with other forest users, there will be little incentive to invest in or manage resources sustainably for future gains. It is therefore important to know the existing tenure regimes of forests and trees when investigating household reliance on forest and environmental resources, and the degree to which this regime is being enforced.

The de jure ownership of forests and other uncultivated areas is traditionally held by governments, not only in tropical countries but globally (White and Martin, 2002). When management capacities and governance structures are not effective, and enforcement and sanctioning are weak, public forests are left open for exploitation by those who are able. Furthermore, if informal (de facto) governance structures are also missing, the result can be an open-access scenario, where forest and tree resources are unrestrictedly exploited, which can lead to overexploitation (Sunderlin *et al.*, 2005).

In recent decades, forest ownership or management has experienced some transition from centralized government to other tenure regimes, commonly referred to as contemporary forest governance (Agrawal *et al.*, 2008). Newer forms of forest governance include decentralization of forest management, or in some cases outright devolution of ownership to local governments or communities. This transition is a result of several considerations, including:

1. Acknowledgement of the marginalization of indigenous peoples and other local communities under centralized forest governance at both national and international levels. This is driving the creation of new forest policies that recognize traditional and locally anchored forest use and ownership claims.
2. Increasing evidence that community-based management of forests is as good as or better than centralized forest management, in terms of economic development and environmental protection.
3. A growing recognition of the lack of forest management capacities among governments and public forest managers, resulting in ample opportunities for corruption and elite capture in publicly managed forests (White and Martin, 2002; Wright *et al.*, 2007; Porter-Bolland *et al.*, 2012).

The devolution of forest management rights to communities makes it possible for households within the community to take part in forest management for long-term benefits, improving their access to forest and tree resources, and better integrating forest product extraction, use and sale into household livelihood strategies. However, community-based forest management (CBFM) is not without its challenges. Households that are not part of the community may have reduced access to forest and environmental

resources as a result of CBFM, and CBFM is in practice also influenced by formal and informal rules, divergent incentive structures, local power structures, and competition for resources (Menzies, 2007; Tole, 2010). Therefore, even with CBFM, better access to forest and tree resources is not guaranteed at individual household levels.

Households or communities can also be given rights to extract certain forest products, mostly NTFPs, rather than actual forest management rights. In Malawi, for example, local people are allowed to collect dry wood, fodder, wild fruits and vegetables from state-owned forest reserves (Kamanga *et al.*, 2009). When households have individual rights to collect NTFPs in a forest reserve, there is an incentive to sustainably manage the resources, and make collection, use and sale of NTFPs a reliable part of livelihood strategies.

SCALING UP SUBNATIONAL SURVEYS TO THE NATIONAL LEVEL – DEALING WITH THE CHALLENGES

The survey design used in the forestry modules for the purposes of an LSMS-type survey is aimed at capturing relevant information across a broad spectrum of socioeconomic, environmental, demographic and cultural gradients. Much of the design of the forestry modules has adapted the lessons drawn from the design and implementation of CIFOR's PEN household surveys mentioned in Section 2 (page 13), which in themselves represent subnational, case-specific surveys (see CIFOR, 2008). There are several challenges in scaling up such surveys to the national level. The design of the survey needs to be flexible enough to be adaptable to different scales of implementation. The flexibility of choosing relevant modules in the forestry modules attempts to cater for this. The implementers of the modules may not be experts in forestry, governance and other aspects related to collecting such data. This requires the use of clear definitions and concepts and the very specific wording of questions to avoid ambiguity. The definitions provided in the sourcebook and explanations in the enumerator manual might help the survey implementers with this. Survey implementers of different levels may be interested in specific and sometimes different research questions. The level of detail and specificity of data may be considered against available resources at different levels. Figure 1 (page 27) gives details on how to make decisions on using the forestry modules for subnational level survey implementers.

Applying the forestry modules at different levels means that the choice of methods may vary, with consequences for the level of data detail. Survey implementers are encouraged to read publications on fieldwork implementation and survey methods (e.g. Angelsen *et al.*, 2011; Luckert and Campbell, 2012). Some guidance on using the modules can also be found in the field manual associated with this sourcebook (Bakkegaard *et al.*, 2016a). In smaller studies, time, skills and resources may be available to go into depth with qualitative methods such as focus group discussions, or perception data, which can yield reliable and valid data with rigorous application. The flexibility of implementing particular sections of the modules at certain times may be limited in national level surveys. For example, conducting a community-level discussion to derive the main seasonal products prior to household surveys is highly recommended, because it provides

a list of products that might otherwise be missed. However, this may not be feasible logistically, as described in Section 3.

HOW TO USE THE FORESTRY MODULES

The forestry modules are comprised of standard and extended sections at the household and community level, and some characteristics of the forestry modules warrant mention.

First, the modules in the standard household questionnaire (denoted HH_Module) are quantitative and aim to reconstruct a measure of full income that can be used as a key indicator of forest and wild product contribution to household welfare. Forestry modules, when appended to other LSMS modules (e.g. Household wage and business, Agriculture, Fishery and Livestock), help in compiling a full income account where forest income is one component. With this, income calculations of proportions of household incomes from forest and wild products can be made.

Second, modules in the standard community questionnaire (COM_Module) provide the necessary supporting contextual information on the study sites. A main part of the standard COM_Modules relies on a community focus group discussion (FGD), where participants are asked to reach a consensus on the use of certain important products. Gathering information in a collective qualitative manner allows the capture of the importance of products at community level that may go beyond purely economic-quantitative contributions.

Third, the modular design of the forestry modules means that the standard and extended modules, which concentrate on a particular theme, can be put together in a way that will collect relevant data for interested users. In this way, the forestry modules can be used by LSMS survey implementers, as well as other independent users.

For LSMS-type survey users

The forestry modules are designed for national-level data collection, such as in LSMS-type surveys. Although the most comprehensive understanding of the overall contributions of forests to household welfare is obtained by implementing the survey in its entirety (which is highly recommended), the instruments are organized by separate modules for each of the themes, with the intention that users with more specific data interests can implement the modules that suit their interests, and therefore choose the modules that are most important to them. For LSMS purposes it is recommended that at least all the standard modules are implemented, as they reflect the basic minimum information needed to develop analyses of forest and wild products' contribution to household welfare and livelihoods.

The standard HH_Modules follow the HAI+ structure (Lund *et al.*, 2011), encompassing household characteristics, assets owned and income, with "+" to indicate extra dimensions deemed important for analyses of value contribution of forest and wild products to household welfare. Household characteristics and assets owned are documented by the standard LSMS household surveys, where forest-related income is captured in the standard household forestry module. The integrated modules (INT_Module) are specifically customized to the LSMS household surveys and represent a series of

additional questions and codes designed to be added to existing LSMS surveys, which capture forest and wild products as they relate to the existing themes described in Section 4. Further topics covered by the household forestry module include the forest resource base and its uses in health, energy and construction, as well as forest-based coping strategies in the face of food shortage and shocks. The extended modules explore further dimensions of forest use. At the household level, these encompass forest cover changes and clearance.

In the community questionnaire, standard components are the seasonal calendar of forest and wild products, most important forest and wild products (MIPs), their unit measurement and pricing, as well as community benefits from environmental services. At the community level, the extended questionnaire delves into forest institutions and community benefits from environmental service programmes.

As components of the LSMS surveys differ among countries, a standard template could not be developed, but specific examples of additional questions to be integrated with existing LSMS surveys from Malawi and United Republic of Tanzania are given in Annex D. It is important to note, however, that the incorporation of additional questions changes the structure of capturing, assessing and analysing the information that was targeted by these existing LSMS surveys.

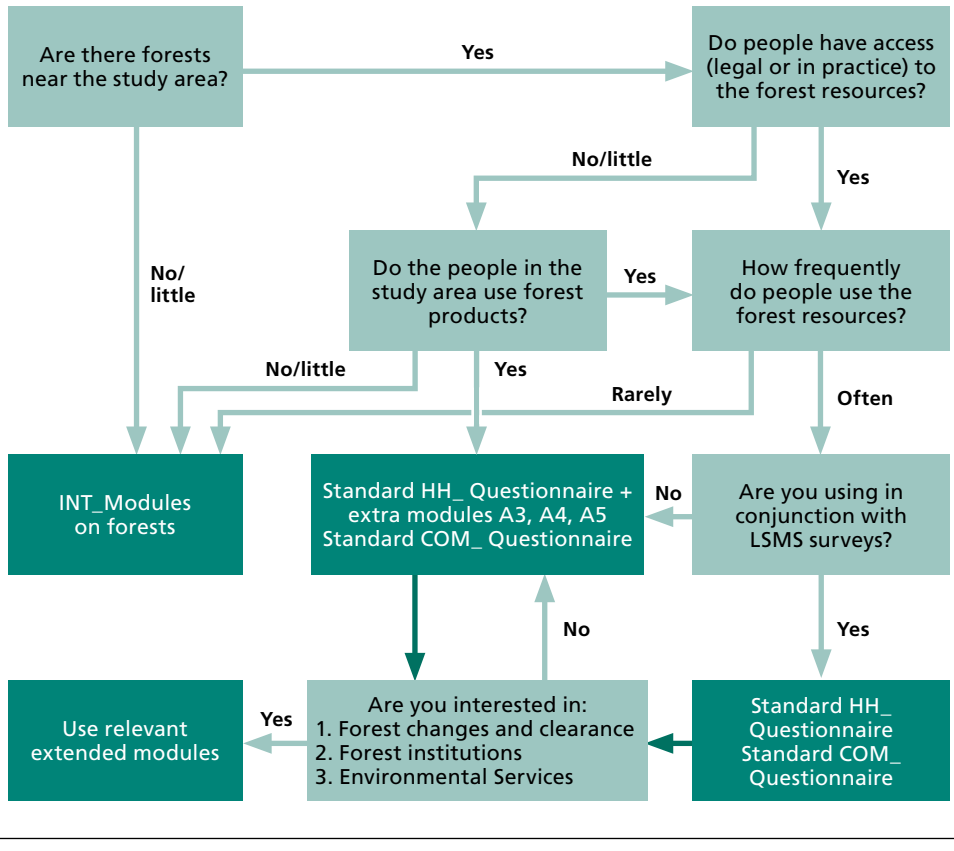
For other users

The forestry modules can also be used for non-LSMS-type surveys that are not of national coverage. In such cases, the relevance of the modules could vary depending on the context, because the use of forest and wild products can vary considerably among places, communities and even between and within households. Implementation decisions for the instrument may therefore depend on the area that is being surveyed. The decision tree in Figure 1 can help in making decisions for using the modules.

As a result, special sections have been designed to collect additional information on household demographics, participants and identification of respondents, when the LSMS household survey is not implemented (see Annex C1). Moreover, forest contributions to income sources such as wages, business and assets can also be captured using the examples given in Annexes C2, C3 and C4, if implementers do not plan to use the LSMS Household Survey in conjunction with the forestry modules.

Users interested in a particular theme are also guided by the theme descriptions in Section 4. Under each theme, the user is referred to sections of the modules that will provide data to address the relevant theme, and examples are provided of research questions that can be answered by the data collected. A synthesis is given in Table 1 (pages 6-9).

FIGURE 1
Decision tree for forestry modules



Dayak man (in Indonesia) repairing a basket used to store the newly harvested upland rice.

© I.W. BONG

3. Measuring the role of forests and trees in household welfare and livelihoods

DEFINITIONS

Socioeconomic, biophysical and cultural factors are likely to vary widely among study sites, including with respect to concepts surrounding forests, resource ownership and resource use. Therefore we need a common list of internationally accepted definitions that as far as possible can be systematically employed, in order to allow for intersite comparisons. In this section, definitions of the most essential concepts of forest, forest products, environmental (grown in the wild) products and incomes are provided, as a guide for survey categorization. A complete list of definitions used in the forestry modules is given in Annex A, and a categorization of products according to degree of cultivation and vegetation system, together with the origin code used in the survey tools, is given in Table 2. The definitions should be consistent with FAO (2012) to the greatest possible extent (see http://www.fao.org/docrep/017/ap862e/ap862e00.pdf).

TABLE 2

Forests, trees and environment: categorization of vegetation systems with variable management intensity

Vegetation system / Degree of cultivation	Forest	Non-forest, tree-based	Non-forest, non-tree, natural	Agriculture
Environmental systems ("wild", i.e. non-cultivated, or managed with low inputs)	Natural forest and old-growth (origin code = 1), secondary and regenerating natural forest (origin code = 2)	Other wooded lands, savannahs/*miombo*,[6] fallows (origin code = 4)	Rangelands, grasslands scrublands (origin code = 6)	
Cultivated systems (planted and/or highly managed)	Planted forest with intensive management (origin code = 3)	Woodlots, trees in farms, home gardens or other agroforestry systems[7] (origin code = 5)		Fruit trees, oil palm plantations, non-tree crops (including those from agroforestry systems)

Sphere of forest and tree systems, products and income

Sphere of non-forest environmental systems, products and income

Non-existing sphere (empty cells)

[6] Depending on tree density and distribution.

[7] Note that some agroforestry systems, such as the "Taungya" system where crops are grown only during the first years of the forest rotation, are considered as forest.

The definition of a "forest" vegetation system in the forestry modules follows FAO (2006, p. 169):

> *Land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use.*[8]

While the FAO forest definition is quite inclusive in terms of its (low) canopy cover threshold, it is fairly restrictive in terms of excluding mixed systems, such as home gardens or woodlots smaller than half a hectare. The same delimitation is not commonly used when we move to "forest products", including in production statistics. An example can illustrate the problem. Suppose a rural household in a highland area uses pine trees for domestic timber, pole and firewood consumption. Some trees come from a communal pine forest (>0.5 ha), but to supplement the household has also planted some trees on farm (<0.5 ha).

If "forest products" were to come only from "forests", hypothetically we would have to exclude from our household survey accounts all pinewood products that were derived from the (technically non-forest) trees on farm, rather than from the community forest, even if we were talking about exactly the same pine tree species. Unsurprisingly such a distinction is normally not made locally, and can also be illusory to pursue in a household survey: wood products especially are usually referred to as "forest products", regardless of whether their origin is woodlots, agroforestry systems (including silvipastures, home gardens), fallows, or other tree-based vegetation systems that are not classified as "forest" in the strict sense.[9]

When we move to the economic-value level of "forest income", should we then follow the narrow "forest" or the ample "forest product" definition? In practice, both types of income delimitation can be of potential interest for policy-makers and natural resource managers. While in welfare terms, the exact origin of forest and tree-based incomes may be of secondary interest, for the management of forest areas, their income-generating capacity will be important to grasp. For example, if an area to be protected provides a large stream of extractive incomes to local populations, closing it off to all access might have uneven welfare consequences.

In addition, forest systems can provide important ecosystem services (e.g. biodiversity protection, carbon stocks or recreational values) that are not necessarily equaled by non-forest tree-based systems. This is even more of an imperative when we talk about natural or near-natural forest systems. Our classification in Table 2 thus depicts three different criteria of interest: forests or not, tree-based systems or not, and wildlands

[8] See detailed explanation at http://www.fao.org/docrep/017/ap862e/ap862e00.pdf

[9] In the household survey questionnaire, we are asking for the main vegetation origin of the product. Yet, to shed light on different origins of the same product, as is the case in this example, the questionnaire would have to be extended to ask for several sources of origin, and for example ask households to determine an approximate share of the total from each source. We believe this will be more relevant in specialized surveys, and have abstained from this approach in the standard household survey.

vs cultivated areas. In practice, mosaic landscapes emerging from a history of complex anthropogenic influences can obviously create shades of grey that may challenge our simplified delimitations, but in principle the categories in Table 2 (together with the other instruments given here) should enable a meaningful assessment of product and income flows in the household economy.

In this sense, as "forest products" we principally count natural, non-planted or "wild" products collected from old-growth natural forest, secondary and regenerating natural forest, plus the cultivated or planted products from managed plantation forest. Forest products can include timber and a wide range of NTFPs, including tree-based (e.g. some fruits), various plants (e.g. tubers), and fauna (e.g. bush pig). However, non-forest tree products originating from home gardens, trees on farm or other agroforestry systems are also included as "forest and tree products". Note that there are other compatibility challenges when comparing this with codes such as the United Nations International Standard Industrial Classification (ISIC).[10]

In Table 2, "non-forest" systems can be broken down into "non-forest tree-based" (column 2 of Table 2), and "non-forest natural" (column 3 of Table 2). Non-forest tree-based systems include savannahs or fallows, as well as the cultivated trees found in agroforestry systems – the latter now in our definition of forest income. The space between what is classified as "forest" and "agriculture" is often challenging to define, often falling between or below multiple land cover definitions and therefore a challenge when it comes to measuring its importance (Angelsen *et al.*, 2011). For the sake of simplicity, products and income from the "non-forest" and "wild" systems (origin codes 4 and 6 in Table 2) are referred to as "wild products" and "wild product income" (Fig. 2, p. 32).

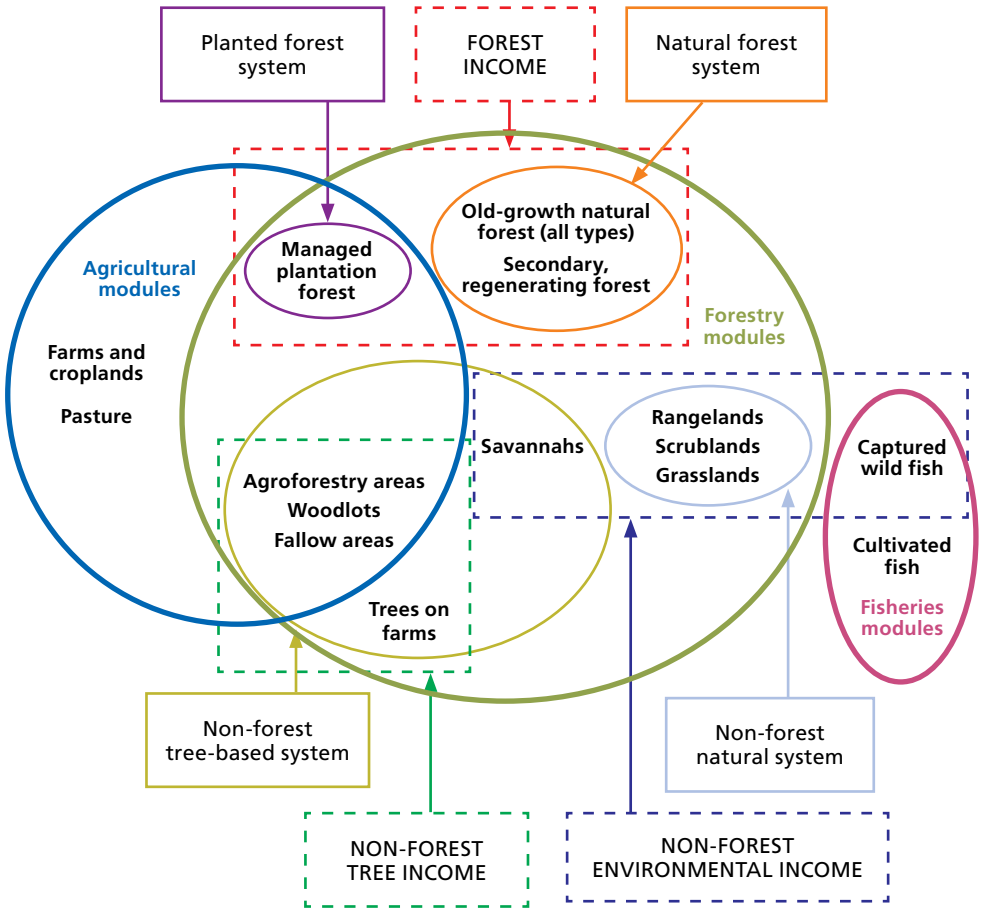
On the income side, "forest income" includes three distinctive subcategories. First, "natural forest income" is from extractive, "environmental" sources, derived from wildly growing (or minimally managed) forest species, which are found naturally in old-growth or secondary and regenerating natural forests. Second, "planted forest income" is derived from products found in managed plantation forests. In a smallholder rural developing country setting, forest environmental income is clearly the dominant element.[11] Finally, as mentioned, non-forest tree income from woodlots, trees on farm, home gardens, and other agroforestry systems is of interest – and as argued often quite cumbersome to reliably distinguish from forest incomes. "Forest and trees incomes" would thus be the concept aggregating all three components (origin codes 1, 2, 3 and 5 in Table 2).

An important distinction to make is our *exclusion of cultivated agricultural goods* from agricultural lands (cropland, pasture, crops harvested in agroforestry and silvipasture, fallow areas) and *cultivated and captured resources* from aquatic environments, which

[10] Consequently the products captured in this section may fall outside the "forestry and logging" codes provided by the standard ISIC code. For example, hunted, fished and trapped animal products will fall under Agriculture and Fishing codes respectively (http://unstats.un.org/unsd/cr/registry/regcs.asp?Cl=27&Lg=1&Co=A).

[11] In the PEN survey, the global average share of plantation forest income constituted only 5 percent of total forest income, although in regions with little natural forest left (e.g. in Asia), this share could come to be significantly higher (Angelsen *et al.*, 2014).

FIGURE 2
Coverage of forest, tree and environmental incomes and their origin in the forestry modules and other LSMS-ISA modules



currently would be covered under LSMS-ISA agricultural and fisheries modules.[12] Importantly, cultivated trees from plantations and trees on farm plots and other agroforestry systems may be captured by both the forestry module and the agricultural module. In the longer run, it will be up to the NSO and other module users to decide by which tool to appropriately capture this product, although we would generally argue that the forestry modules will provide a natural place to assess these income flows in adequate detail.[13]

Users are encouraged to employ where possible the codes and definitions accepted by internationally agreed classifications while implementing the survey; preferably the ISIC code of all economic activities (ISIC Rev.4, http://unstats.un.org/unsd/cr/registry/isic-4.asp) and Central Product Classification for products (CPC Ver.2.1: http://unstats.un.org/unsd/cr/registry/cpc-21.asp) unless otherwise stated in the sourcebook. Details of other classifications and correspondence tables are at http://unstats.un.org/unsd/cr/registry/regdnld.asp?Lg=1. Whereas in principle all products can be distributed to existing classification codes, the survey analyst risks lumping specific forest products in generic categories such as "gathering non-wood forest products" and overburdening residual categories. For this reason, an extended product code list developed by CIFOR is provided in Annex E, Section 1.3, for the benefit of interested users. See also http://www.fao.org/3/a-be999f.pdf for the list of scientific and local names of tropical hardwoods which is used for the Harmonized System (HS) nomenclature updated by the World Customs Organization.

METHODS USED IN DATA COLLECTION

The forestry modules include questions targeted both at individual households and groups of households at community level. Questions have therefore been delegated to the respective modules depending on whether the variable under investigation is expected to vary within the community. If the variable is not expected to change at household level, then collecting data at community level will save expending resources carrying out a household survey. Sometimes, it will be useful or necessary to collect data at both levels. When the unit of analysis is individual households, data at community level will provide contextual information and may also feed into the development of the household surveys. Conversely, studies with a community focus will benefit from data collected at household level to provide information on specific interhousehold variation, for example, the perception of and adherence to local rules regarding resource use among different types of households in the community. Having household-level data in a community study also reduces the risk of drawing incorrect conclusions based solely on aggregated data (Robinson, 1950; Rindfuss *et al.*, 2004). For example, parameters such as income portfolios, consumption of forest products and coping strategies adopted

[12] Note that our survey components may not cover the totality of "environmental incomes", in that wild fish caught in rivers, natural lakes, etc. would be covered in the fisheries module.

[13] Likewise, any overlapping product classification needs to be clarified by the analyst during data analysis using the codes for product origin.

against shocks are likely to vary widely across households. Therefore, these variables are best investigated at household level. Conversely, information on the most important products (MIPs), including their harvesting/sale periods, units and pricing, and forest programmes/extension services is collected at community level, as these data will most often not differ within the same community. Quality of data was also found to be better in some cases at community level, such as on the rules surrounding use of forest products as experienced in the Tanzanian field test (Persha, 2015).

Focus group discussions (FGDs) are a common method employed in the community questionnaires (standard modules on most important products and seasonal calendar, and extended modules on forest institutions and community environmental services). Village meetings or FGDs are useful instruments to collect important qualitative data, as they capture overall values and importance, such as forest and wild products that go beyond the immediate economic benefit. Small FGDs allow space for deliberation between members to arrive at a consensus. In the Indonesian field-testing of the forestry modules, 13 people participated on average in the FGDs, which was deemed to be an appropriate number that allowed for effective and inclusive discussion (Bong *et al.*, 2016). The COM_Modules A to F provide the structures to help guide interviews, facilitate group discussions and enable data collection in a systematic and comprehensive way. Nevertheless, to account for the time and resource limitations that NSOs may face in implementing FGDs at community level, these sections could be completed together with a key informant.

Key informant interviews (KIIs) are used in the community instrument to collect information such as quantitative units and pricing. KIIs are often carried out with village officials and other stakeholders who have lived for a long time in the community and/or are knowledgeable of changes and trends in local socioeconomic, political and cultural conditions. They are often valuable sources of information, especially when written records are unavailable. For units and pricing, good information depends on the key informant being active in collecting and selling a variety of forest products, and field-testing of the separate forestry modules in Indonesia and United Republic of Tanzania (see Bong *et al.*; 2016, Persha, 2015) showed that implementing this section as a part of the FGD was effective in collecting data on a large and diverse range of products.

Secondary data are important sources of contextual information on infrastructure (e.g. roads, schools), demographics (e.g. population, age distributions) and village land size and uses (e.g. forest, farmland). Survey implementers may also make use of observation or measurement to contextualize the data collected. In practice, it is important to triangulate data by collecting information from different sources and methods in order to ensure data accuracy.

Perception data collection is a widely used method, even in LSMS surveys,[14] to collect expressed opinions or perceptions of people on a particular topic – also termed "subjective

[14] Sourcebooks specifically considering perceptions of climate change variability, and resulting adaptation actions in agriculture relating to water stress and land management, are covered by Bandyopadhyay *et al.* (2011) and McCarthy (2011) respectively.

data" (Takeuchi *et al.*, 2015). Although some conditions are clearly measurable, "people can also make subjective assessments of these objective conditions" (Takeuchi *et al.*, 2015), so that perceptions can serve to attribute personal relevance to these conditions (Deressa *et al.*, 2011). The extended COM_Module on community environmental services relies on collecting perceptions of climate change (Section F1), with an aim to link them to potential actions to adapt to these impacts. A key strength of such perception data is thus the timely warning of upcoming areas for appropriate policy interventions. For example, FAO's subjective food insecurity scale can detect an early onset of malnutrition, while corresponding objective indicators such as being underweight are retrospective (Takeuchi *et al.*, 2015).

SOME DATA-COLLECTION ISSUES

Difficult concepts

During surveying, enumerators can identify that certain concepts and terms are ill-understood by respondents, perhaps because they are not adequately conveyed (see e.g. Section 5, page 57, on field-test experiences with questions to households on environmental services). Hence it is imperative to train enumerators and pre-test survey instruments to correct and adjust questions accordingly. Lessons from the Tanzanian field test showed that due to forest-related terminology and concepts, the LSMS-type implementing agency should partner with a forestry NGO or national agency to substantially train at least field coordinators and supervisors (if not enumerators, too), prior to implementing the forestry module. This may not only enhance household-level data quality, but also raise the level of engagement in discussion from community FGDs (Persha, 2015).

When concepts prove unknown to respondents, the line of questioning may have to be changed. If enumerators have to explain concepts at great length, this may already bias respondents' answers in certain directions. For example, including perceptions on short-term climate variability (e.g. five years or less) proved to be more reliable than longer-term trends (Maddison, 2007; Gbetibouo, 2009; Bandyopadhyay *et al.*, 2011).

Seasonality and recall period

Forest-based activities are often characterized by marked seasonality, which requires special attention for the timing of the survey, and for recall periods during data collection. Preferably, frequent surveys should be carried out with shorter than annual recall periods (e.g. quarterly), in order to better capture seasonal variations in forest uses. However, this will rarely be possible in national surveys. Information on regular, non-seasonal transactions and activities, such as collection of woodfuel, can best be captured with shorter recall periods, while irregular activities, such as seasonally harvested NTFPs, or a serious flooding event, may demand longer recall periods.

Generally, retrospective questions with long recall periods are challenging, especially when remembering smaller transactions (e.g. Angelsen and Lund, 2011). Another reporting bias with the opposite effect is telescoping, where respondents recall "too far

backwards", thus overestimating incomes (Fisher *et al.*, 2010b). Certain customized techniques may improve response accuracy, such as linking recall periods to external events, or training enumerators to cross-check related answers made elsewhere in the survey questionnaire (see also Beckett *et al.*, 2001). In standardized surveys such as LSMS, however, the need for standardization of responses may limit the scope for introducing customized recall aids.

The forestry modules collect annual forest-related income data at household level with the aim of being compatible with the temporal scale adopted in existing LSMS surveys, using annual recall by default. Ideally, to improve data quality and reliability, the seasonal calendar under standard COM_Module A should be conducted prior to the HH_Modules to start to identify the MIPs harvested/sold over the year in the community, and these can be included directly in the questionnaires (see discussion in Section 4 if such sequencing is not possible). This is to ensure that all important seasonal products are asked about and not overlooked. Alternatively, the implementation can be timed to capture the harvest of these products, particularly as seasonal infrequent collection can be hard to recall. However, there are logistical challenges and cost implications in implementing large-scale national surveys in this manner.

Distinguishing product origins

The separate forestry modules collect information on the origin of forest products at varying levels of detail in the different modules of the survey: standard COM_Module A regarding the seasonal calendar, Module B on the most important forest and wild products, standard HH_Module A1 on income from forest and wild products, and Module C on forest resources – energy, health and construction. The categories for origin include old-growth natural forest (code = 1), secondary/regenerating natural forest (code = 2), managed plantation forest (code = 3), non-forest tree-based wild systems including savannah and fallows (code = 4), non-forest tree-based cultivated systems including trees on farms, woodlots and agroforestry (code = 5), and non-forest natural systems including rangelands, grasslands, scrublands and mosaic landscapes (code = 6) (see page 29). The validation and comparability of data may be problematic during analysis when the survey focuses on diverse sources of origin. Linking the products to origin of where they are collected, however, will highlight the areas that may be facing increased pressure from resource use and the sustainability of the resource base. These codes will also help data analysts classify products according to their specific definitions and flag potential products that have also been captured under the agricultural module. Further understanding the access to and ownership of these areas will show policy-makers where interventions for conservation or regulated use may be necessary.

Measurement unit and price

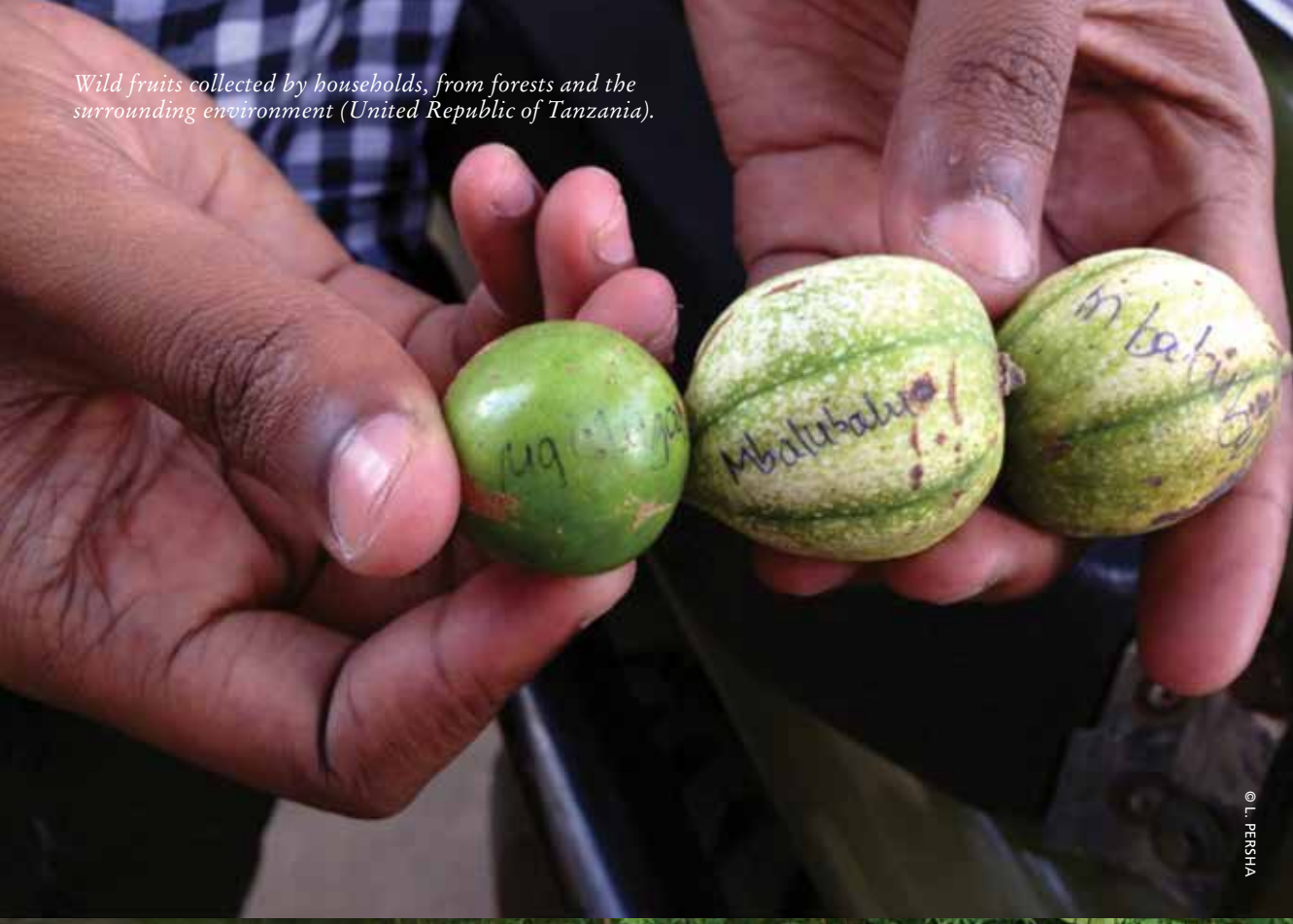
Forest and wild products are widely traded using non-standardized weight or volume measures in local markets between countries, potentially presenting difficulties when it comes to income estimations and intersite comparisons/aggregations. The forestry modules allow data to be recorded in local units, and a full list of codes is provided in the

units section of the Codebook. Recording local units will ensure that the data given are more accurate. Nevertheless, standardization of local measurements to common units is necessary to facilitate data analyses and comparison among communities, regions and even countries. Doing so will also be useful when attempting to assign missing values, such as for the calculation of subsistence income. Unit conversion and pricing for each product is carried out with the help of a key informant, often the village head, under standard COM_Module C, where the metric equivalents of main local units used and price per unit are recorded.[15] Alternatively, as experienced in the Tanzanian field test, it could effectively be conducted during the FGD (Persha, 2015).

The preferred method of valuation to report product prices is self-reported values, i.e. values reported by the respondent. Self-reported values can have the advantage of collecting local farm-gate prices, compared with urban prices that are inflated by transport and commercialization costs (Cavendish, 2002). However, self-reported values may be unreliable if markets are thin or when certain products are rarely traded, used only for subsistence, or priced differently throughout the year (Wunder *et al.*, 2011). The mean price, possibly averaged for each season if necessary, can be used if the product is sold all year round; otherwise the current or most recent price per unit is asked for. The barter value of traded goods (say, rice or sugar), indicating the amount households are hypothetically willing to accept in exchange, or else the hypothetical monetary price households would agree to pay (or, alternatively, accept to be paid) for the product, can be taken if the product is for subsistence use. Wunder *et al.* (2011) further discuss the pros and cons of different pricing methods. Given that the subsistence element in much of environmental income is dominant, finding the right price for (a multitude of) subsistence products can be quintessential for getting the forest and environmental income figures right. In the PEN project, willingness to accept hypothetical prices often proved to be easiest for respondents to quantify when produced goods were non-traded.

For non-LSMS users, information regarding units and pricing and community benefits (COM_Modules C and D) is collected through key informant interviews or focus group discussions. For LSMS users, prices are generally collected in existing LSMS community questionnaires. For units, countries have been urged to collect and disseminate libraries of non-standard units to be used alongside survey operations. These libraries can be assembled in more or less close coordination with the implementation of any one survey.

[15] The LSMS team is preparing a sourcebook on non-standard units (forthcoming) which will provide more detailed background and instructions for incorporating non-standard units into data collection.



Wild fruits collected by households, from forests and the surrounding environment (United Republic of Tanzania).

© L. PERSHA

A villager drying Puri *(Kratom Borneo,* Mitragyna speciosa*) leaves. Villagers in Indonesia collect the leaves from the trees that grow in the swampy forests, dry them under the sun, and sell them for cash income.* Puri *is used for medicinal purposes to reduce pain and uplift mood and for recreational purposes.*

© F.R. JUANDI

4. Collecting household welfare data through the forestry modules

As explained in Section 2, the main aim of the forestry modules is to provide an add-on to LSMS-type surveys for collecting essential information on the contribution of forest and wild products to household welfare and livelihoods over the survey reference period (usually 12 months prior to the interview).[16] The household is defined as "a group of people (normally family members) living under the same roof, and pooling resources (labour and income)" (see Annex A: Definitions), which normally excludes temporary visitors, tenants, etc.

The structure of the forestry modules for LSMS-type surveys is shown in Box 2, using various methods. The HH_Modules are implemented through face-to-face household-level interviews, while the COM_Modules include both participatory exercises, such as focus group discussions on the identification and seasonal collection of the most important forest and wild products (MIPs), as well as key informant interviews to gather basic information, such as units, pricing and community-level interventions. The modules may be used in such a way that they can inform each other. For example, the seasonal calendar in the COM_Module provides a locally derived list of MIPs that can be asked about in the HH_Module on income from forest and wild products. Country-specific adjustments may be needed to ensure a proper flow and sometimes, when using the forestry modules as part of the national LSMS, this sequencing may not be possible due to logistical or other limitations.

The community questionnaires and components provide important contextual information for survey implementers regarding important products and rules regarding product use by local households. In cases where focus group discussions are not possible, community-level questionnaires will need to be dropped. Information on units and pricing may have to be obtained from other existing national surveys (although product-specific units may not exist) and secondary data sources. Sometimes, the local knowledge of the survey team may suffice in identifying and capturing the most important and seasonal forest and wild products.

[16] The forestry modules collect annual forestry-related income data at household level, aiming to be compatible with the temporal scale adopted in existing LSMS surveys. Survey implementers should however be aware that forestry activities are characterized by seasonality, which requires special attention to the timing of the survey and recall periods during data collection. Preferably shorter recall periods (e.g. quarterly) and frequent visits are used to better capture seasonal information, especially with regard to regular transactions and activities (e.g. collection of fuelwood) which are easier to forget as time elapses. Irregular or unexpected events, on the other hand, may demand longer recall to be correctly reflected.

BOX 2

Structure of forestry modules for LSMS-type surveys

Standard community questionnaire

COM_Module A: Seasonal calendar
COM_Module B: Most important forest and wild products
COM_Module C: Units and pricing
COM_Module D: Community benefits
- COM_Module D1: Practices
- COM_Module D2: Support

Extended community questionnaire

COM_Module E: Governance
- COM_Module E1. Forest institutions
- COM_Module E2. Enforcement and penalties

COM_Module F: Community environmental services
- COM_Module F1: Perceptions of climate change

Standard household questionnaire

HH_Module A: Income
- HH_Module A1. Income from forest and wild products
- HH_Module A2. Other forest-related income sources, including PES programmes

HH_Module B: Forest resources – energy, health and construction
- HH_Module B1. Forest resource base
- HH_Module B2. Forests and energy – fuelwood and charcoal
- HH_Module B3. Forests and health
- HH_Module B4. Forests and construction

HH_Module C: Food shortage and crises
- HH_Module C1. Food shortage
- HH_Module C2. Shocks and crises

Extended household questionnaire

HH_Module D: Forest changes and clearance
- HH_Module D1. Forest changes
- HH_Module D2. Forest clearance

Pilot testing of the modules might help to determine timing, sequencing and best flow of modules, and a visit or investigation based on secondary data to identify main forest and wild products in the study area can be conducted prior to main module implementation in the field. Additional modules have been retained for the benefit of

users for non-LSMS-type surveys (Box 3; Annex C). Editable forestry modules can be downloaded from http://www.fao.org/forestry/forestry-modules.

BOX 3

Additional modules and templates for non-LSMS-type surveys

(1) Templates for basic data at household and community level
- I. Identification of household
- II. Basic information on household members
- III. Identification of principal respondents
- I. Identification prior to community meeting
- II. List of participants at community meeting

(2) Extra modules on forest-related income and assets
- EXT_Module A3. Wage income
- EXT_Module A4. Business income
- EXT_Module A5. Forest-related assets

SEPARATE FORESTRY MODULES

Income from forests and environment

The overall objective of HH_Module A1 is to generate information necessary to assess the economic contribution of forest and wild products to household livelihood and economic welfare during the preceding 12 months. This section of the module will produce data on gross income, costs of processing and other costs of production, thereby capturing the value-added, and net income earned (net of input costs). Labour involved in the collection of the product is also captured for the whole household in terms of hours per day, days per week and weeks per month, to calculate time spent and thus the value of family labour.

The first table (questions 1.1 to 1.14) covers income earned from unprocessed (raw) forest and wild products, starting with a filter question (1.1), and is structured into the following components: the specific forest/wild product collected by households (product); the person in the household collecting the product (1.2); the number of people involved in the activity (1.3); the place of collection, reflecting access to each product (1.4); labour (time) invested by the households in collection of the product (1.5);[17] total quantity of the product (1.6); unit in which the product is collected (1.7); quantity for own use (subsistence) (1.8b); quantity for sale (cash) (1.9b); price per unit (1.10), which

[17] This question may be hard for respondents to answer, particularly when labour inputs come in small increments. When it is not deemed important to quantify labour inputs precisely, survey designers may opt for just recording information on the household members involved in collecting products (questions 1.2 and 1.3), dropping question 1.5.

when multiplied by total quantity allows for calculating its gross value (1.11); costs associated with transport and marketing (1.12b); costs associated with purchased inputs and hired labour as well as rents or fees (1.13b), which when deducted from gross income will allow for estimation of net revenue earned from each product (1.14).

The second table (covering 1.15 to 1.27) details income earned from processed products. Here, the raw material is regarded as an input cost, and therefore is not recorded as a raw material in 1.1–1.14, but rather as a raw material input (1.26) to avoid double-counting. This section can then help to determine the value of the value-adding process.

As such income data are collected at household level, it is also feasible to assess whether households benefit equally from the most important forest or wild products for cash and subsistence at community level, as asked in standard COM_Module B. This allows for a more detailed assessment of the MIPs, for example on the importance and heterogeneity of certain products that could vary between household and community levels.

The level of specificity of products for which data are collected will be determined by the interests of the user, and will present a trade-off between time, resources, and reliability of data. Products detailed to the level of species names may be useful to conservation organizations; however, overly detailed questions could sometimes be challenging, especially when the respondents cannot accurately report at that level of detail (e.g. respondent cannot identify different varieties of mushroom). Likewise, greater specificity of products often results in a lower number of observations in each group, which may make such data unusable at national level. For the purposes of national data collection, product categories and/or common products may suffice. The information may also be instrumental in highlighting the products that serve multiple interests of different stakeholders (e.g. livelihood vs conservation).

Also from these data, forest and wild product extraction can be analysed with the primary collectors of products to determine how social factors, such as age, gender and education, can influence the collection of certain products. When used in conjunction with LSMS surveys, these data are already collected in the standard LSMS household questionnaire.

Other forest-related income benefits are captured in standard HH_Module A2 (other forest-related income sources). This section records income earned from PES schemes or other types of compensation over the past 12 months.

Examples of the kind of questions that can be answered from data on income include:

- How does income from forest and wild products contribute to household livelihoods?
- What particular products are important to livelihoods in cash or subsistence terms?
- How are forest and wild products used by different genders and age groups?
- What forest types provide the bulk of forest products?
- What proportion of household income is derived from payments for environmental services?

Food and nutrition (game/bushmeat, other NTFPs)

The provisioning function of forests and non-forest environments is essential to household welfare, in particular the products that contribute to households as food. Forest

foods can add to households' daily diet and are able to provide vital vitamins, minerals, calories and proteins. They can also play important gap-filling functions in predictable lean seasons and during crises. Products used for household consumption (subsistence) may include a variety of vegetables, fruits and bushmeat, and quantities are captured at household level under standard HH_Module A1 (question 1.8b). This module however, may not capture full food consumption of households as it only captures consumption of collected forest and wild products, without indicating products that may be purchased or donated. The standard COM_Module B on the most important forest and wild products qualitatively captures the most important products for community subsistence (and cash). COM_Module A on the seasonal calendar documents the high season for harvest and sale of the main forest and wild products collected in the community.

Examples of the kind of questions that can be answered from data on food and nutrition include:

- How important are forest and wild products to rural communities?
- What are the main products used and/or sold by communities, and how sustainable is their extraction likely to be?
- What is the quantity of forest products consumed?
- What is the diversity of products that contribute to household diet?

Forest-related employment/business benefits

Households can derive benefits through employment or through businesses related to forest and wild products. These primarily economic benefits are usually captured in the LSMS household survey (see e.g. Sections E and N of United Republic of Tanzania National Panel Survey ((NPS 2012/2013)) household and individual questionnaire), and importantly the correct forest-related codes must be provided to capture forest-related work and business.

A wage and business section has been developed for use in non-LSMS-type surveys (Annex C2 and C3). EXT_Module A3 (forest-related wage income) starts with a filter question (3.1), identifies the household member it refers to (3.2), asks about type of work that the household member is engaged in (3.3), period unit and rate per period (3.4a and 3.4b), number of periods worked in the past 12 months (3.5), number of weeks worked per month (3.6), and number of hours worked per week (3.7), in order to calculate total wage income (3.8). This section only relates to occupations linked to forests, with the aim of understanding forest employment benefits.

EXT_Module A4 (forest-related business income) starts with a filter question (4.1), and continues with the type of business (4.2), total gross income earned (as sales) (4.3), total net revenue (4.4), number of employees that are non-household members (4.5), expenditure on wages and salary (4.6), expenditure on raw materials and inputs (4.7), transport and marketing costs (4.8), other operational expenses (fuel, electricity) (4.9), other costs (4.10), and months of operation over the past 12 months (4.11). The current value of capital stock in the business (4.12) is also reported. Similarly, this section aims to demonstrate the business benefits derived from forests, but does not include forest product processing, which is captured under HH_Module A1 (1.15 to 1.27).

Examples of the kind of questions that can be answered from data on forest-related employment include:

- Which natural resource-based businesses/occupations are most common?
- Which natural resource-based businesses/occupations make the largest contributions to household income?

Forest-related assets

LSMS household questionnaires include an assets section (e.g. Section M of Tanzanian Household Survey); however relevant forest-related assets codes need to be developed in order to clearly capture and document forest-related assets. Here, we emphasize that assets can be multipurpose, creating inevitable overlaps with the assets section in the agricultural questionnaire, for example. It might be challenging to segregate the asset use for forestry and agriculture separately.

A forest-related assets section has been designed for non-LSMS-type surveys (Annex C4). EXT_Module A5 starts with a filter question (5.1), and then continues to enquire about household ownership of a particular asset (5.2), the quantity of assets owned (5.3), the age of the asset (5.4), the value of the asset if sold today (5.5), and frequency of asset use for forest-related activities (5.6). Key assets to be examined include transportation for forest products, such as animals (e.g. horses, donkeys), motor vehicles (e.g. trucks, pickups) and watercraft (e.g. boats), as well as diverse tools such as chainsaws and sawmills, used for timber harvesting and processing, and shotguns or rifles, which could be utilized for bushmeat hunting. Certain assets may be illegal, therefore appropriate caution needs to be taken in asking about these products.

Examples of the kind of questions that can be answered from data on forest-related assets include:

- What is the quantity and value of forest-related assets owned by the household?
- How frequently do households utilize (certain) forest-related assets for (certain) activities?
- Does the possession of certain assets correlate with more intensive uses of certain products?

Energy (fuelwood/charcoal)

The contribution of forests to energy needs is covered under standard HH_Module B2 on forests and energy – fuelwood and charcoal. Standard HH_Module A1 collects information on the quantities of products collected for consumption (1.8b) or sale (1.9b), and subsistence (1.8b*1.10) and cash income (1.9b*1.10) earned from fuelwood and charcoal. This section starts with a filter question (2.1) and provides subjective assessments of the subsistence use of fuelwood for cooking (2.2), water sterilization (2.3), heating (2.4), and lighting (2.5) compared with other energy sources. It also asks about quantity of purchased fuelwood and charcoal (2.6, 2.7), as well as ownership (2.8) and access to the land (2.9) where fuelwood and charcoal is collected.

Examples of the kind of questions that can be answered from data on energy include:

- What is the quantity of fuelwood used, sold, processed?

- Who are the main collectors of fuelwood or processors of charcoal, and where is this resource collected?
- How important is the role of wood energy in household use, compared with other alternatives?
- What is the status of ownership and access where households collect fuelwood or process charcoal?
- What are the implications of access and use for future household use and reliance on wood energy?

Health (medicinal plants)

Standard HH_Module A1 collects information on the quantities of products collected for consumption (1.8b) or sale (1.9b), and subsistence (1.8b*1.10) and cash income (1.9b*1.10) earned from medicinal plant products. A detailed section further investigating the origin, availability of medicinal plants, and importance in household health is found in standard HH_Module B3 on forests and health. Starting with a filter question (3.1), it asks for data on how medicinal plants are obtained (3.2), ownership (3.3) and access to the land (3.4) where they are collected, changes in collection times (3.5) and availability (3.6) over the past five years, household responses to a decrease in medicinal plant availability (3.7), and comparative use and preference for medicinal plants to modern medicine in treating illness (3.8).

Examples of the kinds of question that can be answered from data on health include:

- What are the quantities and values of medicinal plants collected for use and sale?
- What are the origins, tenure and access to the land where medicinal plants are found?
- How have households responded to changing availability of medicinal plants?
- What are the implications of access/changing availability for household health?
- How sustainable is extraction of the product likely to be?

Construction and fibre products (forest products as building materials, other uses of wood)

Forest and wild products provide resources often used for the construction of rural dwellings and other shelters and fences, e.g. timber, rattan, fibre, vines/lianas, thatch, bamboo, brick production, as well as the construction of canoes, boats and other implements. Standard HH_Module A1 collects information on the quantities of products collected for consumption (1.8b) or sale (1.9b), and subsistence (1.8b*1.10) and cash income (1.9b*1.10) earned from these products. HH_Module B4 on forests and construction deals specifically with products collected for shelter, starting with a filter question (4.1), and asking about main products used (4.2), reliance on use of forest products for construction relative to alternatives (4.3), ownership (4.4) and access to the land (4.5) where products were collected. This section also seeks information on household access to materials used for shelter.

Examples of the kind of questions that can be answered from data on construction products include:

- What are the quantities and values of resources collected, and what is the legal tenure of the land where these materials are largely collected?
- What are the implications for sustainability of the product?

Other products from forests/trees (fodder, furniture, arts and crafts)

Forests can provide a variety of other products that are used to make clothes (e.g. dyes, skins), furniture, arts and crafts (e.g. woodcarvings, musical instruments), for personal hygiene (e.g. twigs for dental care), and can be a source of precious metals (e.g. gold, diamonds), as well as sources of browsing and fodder for livestock. Standard HH_Module A1 collects information on the quantities of products collected for consumption (1.8b) or sale (1.9b), and subsistence (1.8b*1.10) and cash income (1.9b*1.10) earned from these products. Standard COM_Module A on the seasonal calendar can also uncover the variety of forest and wild products collected by the community. Importantly, these products may be uncommon and will require substantive attention on the part of the enumerator to ask for the particular products.

Examples of the kind of questions that can be answered from data on other forest products include:

- Which diverse types of forest and wild products are collected by households in the community?
- What is the quantity used and sold by households?
- Are there any forest products that are central as inputs to other income sources, including downward linkages (e.g. fodder for livestock) and/or household welfare, and how important is their role?

Regulating and supporting environmental services

The forestry modules collect data on regulating and supporting services – using the terms of the Millennium Ecosystem Assessment (2005). At a very general level, income derived from diverse schemes of PES is recorded under standard HH_Module A2 on other forest-related income sources. Questions in this section ask about the value of payments surrounding particular household practices that may relate to payments for environmental services. Specifically, it starts with a filter question (2.1), asks whether payment was received by the household to carry out certain practices (2.2), and about the programmes associated with the payments (2.3). It also asks the total amount paid (2.4) and the length of participation in carrying out the practice (2.5).

The module further investigates whether a formal contract was entered into to receive the payment (question 2.6), length of the contract (2.7), hectares or trees included under the contract (2.8), total payment per hectare or per tree (2.9), type of in-kind benefits (2.10) and their value (2.11), and who is making the payments (2.12). Overall, these data allow more comprehensive data collection of varied PES scheme designs and their contribution to household welfare. They also identify the PES administrator, who may be an important stakeholder in local resource management. The final part of this section documents the activities that households forgo due to engagement with PES schemes, for a more accurate picture of how PES participation could change household livelihood strategies.

Questions regarding community environmental services and benefits are covered in two sections. Standard COM_Module D, on community benefits from forest-related land use or management programmes, elicits information on community participation in programmes that relate to certain practices (questions 1 and 2), whether communities continued practices over the past 12 months (3), direct benefits (in kind and cash) (4) resulting from community participation, duration of participation (5) and implementer of the programme (6).

An extended COM_Module F on community environmental services is a qualitative section on COM_Module F1's perceptions of climate change. Specifically, it starts with how the focus group feels that climate change is affecting their community (questions 1 and 2), including steps taken to combat or protect against changes (3 and 4). It also derives perceptions on the effectiveness of implementing activities to overcome negative climate-change effects (5), and the perceived usefulness of continuing such actions (6).

Data on environmental services could help to answer the following questions:

- What is the contribution of PES schemes to household economic welfare?
- What is the nature of activities forgone by households due to compliance with PES schemes, and how does this impact on household livelihood strategies?
- At community level, what are the main practices carried out by communities that have resulted in in-kind or cash benefits, and who are the main implementers of such programmes?

The module on regulating and supporting environmental services was developed and tested in the pilot countries (see Section 5) to gather more specific data on climate change variability and adaptation strategies, as well as the characteristics of PES schemes at household level. In field-testing the forestry modules in Indonesia, enumerators found it difficult to explain the concept of "environmental services". For many respondents, it was their first introduction to the concept, so they had difficulty making connections to forests, such as in providing answers to questions on services from the forest for climate change mitigation and adaptation (Bong *et al.*, 2016). In the Tanzanian field test, the unfamiliarity of some of these concepts among enumerators highlighted the need for longer training and more technical background (Persha, 2015). Due to the difficulties associated with the sections on environmental services, this was subsequently dropped from the household questionnaire, but retained for the community questionnaire.

The HH_Module on environmental services has been relegated to Annex C5 for interested users who may want to improve and use these questions.

Extension services

Standard COM_Module D2, on support, asks if communities have received any forest-related support (such as technical assistance or training) over the past five years (question 7), whether it was provided in the past 12 months (8), and who offered such support (9). This can identify priority areas where forest external support is lacking, show how the support is being targeted, and by identifying the main providers of support help to coordinate extension efforts.

Forest changes and clearance

Forest changes are covered under extended HH_Module D1, which examines perceived forest changes including the area of forest in the past five years (question 1.1) and the main reasons for such changes (1.2). We emphasize that capturing forest area change is difficult, due to multiple forest uses with different values and collection radii, private vs collective tenure, overlapping uses by several communities, and so on. Specialized stand-alone surveys, possibly supplemented by remotely sensed data, may be better equipped to tease out these complex conditions. Nevertheless, the data allow for identification of major drivers of changes in forests from the perspectives of local households, using a five-year recall.

HH_Module D2 on forest clearance starts with a filter question (2.1), then investigates forest area cleared by the households over the past five years (2.2), forest area cleared by the community over the past five years (2.3 and 2.4), size of areas abandoned to regenerate (2.5), areas replanted with trees (2.6, 2.7), and the purpose of the trees planted (2.8). It continues to document clearing by households over the past 12 months (2.9), area cleared (2.10), purpose of clearance (2.11), crops planted in the cleared forest (2.12), type (2.13), age (2.14) and legal ownership of forest cleared (2.15), access to cleared lands (2.16), and distances to cleared forest (2.17). As the nature of clearing may be illegal and sensitive, data collected in this section may be underestimated. The use of geo-referencing greatly enhances the possibility of matching household-level information with remotely sensed information on the size (and health) of surrounding forest areas, thus providing options to validate such data.

Data on forest changes and clearance could help to answer the following questions:

- What are households' quantitative perceptions of forest change?
- What types of forest are being deforested/what areas are reforested?
- What are the main drivers of local deforestation and/or afforestation/reforestation?
- What is the nature of access to the land where forest is cleared?
- To what extent does household self-stated forest clearing match remotely sensed deforestation (e.g. through satellite imagery)?

Shocks and coping strategies

HH_Module C1 on food shortage focuses on household experience with food shortage over the past 12 months (questions 1.1 and 1.2), and whether forest and wild products were used in response (1.3). Importantly, the section documents the importance of forest and wild products compared with other strategies for overcoming food shortage (1.4). It then asks which forest and wild products were used (1.5), including how they were obtained (1.6), and whether the products were sold or consumed (1.7). In combination with standard sections in the LSMS household survey (e.g. Section H on Food Security), analysts can determine when and to what extent shortage-led needs are being met with extraction of forest and wild products.

HH_Module C2 on shocks and crises adds to the current shock section in the LSMS household survey (e.g. Section R on Recent Shocks to Household Welfare), which does not include forests as a coping strategy. The aim of this section is to systematically

investigate how important households consider forests as a coping strategy, compared with other coping strategies for various shock events. For each shock, data are collected on whether the household experienced it (question 2.1), ranking the top three most significant shocks (2.2), whether forest and wild products were collected to help the household recover (2.3), which products were used or collected by order of importance (2.4), whether the products are consumed and/or sold by households (2.5), where products are obtained (2.6), and finally to what extent households perceive the coping strategy as helping them to recover (2.7). These data will support evidence of whether forests function as a safety net for local users, and highlight the main user groups and products concerned.

Data on shocks and coping strategies could help to answer the following questions:

- How many months do households suffer food shortage, and do forest and wild products play a role in coping with it?
- How important are forest and wild products to household resilience in times of crises and shock, compared with other coping strategies?
- Which products are most commonly used to recover, and how are they used?
- Does forest-based coping focus on direct product use, or rather on generating cash through product sales?

Governance, access and tenure

Access to and tenure of the land where products are collected is a cross-cutting theme, and can be found in relation to access and ownership of the forest resource base where wood energy, medicinal plants and structural materials are sourced (standard HH_Modules B1, B2, B3, B4), as well as access and ownership of land where forest is cleared (HH_Module D2) and where most important forest and wild products are sources (COM_Module B).

At community level, the Extended COM_Module E on governance is designed to elicit information on formal (de jure) and informal (de facto) rules regulating the use of the MIPs identified in standard COM_Module B on the most important forest and wild products. COM_Module E1 explores the formal and informal rules regulating harvesting and use of an MIP (question 1.1), as well as who makes the rules (1.2), activities influenced by the rules (1.3), if rules are respected and enforced (1.4), status of these rules (de facto or de jure) (1.5), permission required to harvest MIPs (1.6), and details of the permit (e.g. payments for permit, 1.7; issuer, 1.8). It also asks whether the area where collection takes place has a sustainable management plan (1.9), and if so whether the permit for use was approved by the correct authority (1.10). COM_Module E2 on enforcement and penalties documents enforcing the formal (2.1) and informal (2.4) rules, the main types of penalties for infractions of the de jure and de facto rules (2.2, 2.3, 2.5, 2.6), as well as the number of penalties issued in the past 12 months (2.7).

Data on governance could help to answer the following questions:

- What is the nature of ownership and access to the land where products used by the household, e.g. for energy and health, are extracted?
- What are the differences in the level of compliance, enforcement and penalties between formal (de jure) and informal (de facto) rules?

- What products are usually governed by rules, and what particular aspects regarding their collection are governed and enforced?
- What is the nature of household forest access: rights, distance, transport time?

Household-level characteristics

As noted in Section 2, characteristics such as age, gender, education and labour effort can have a large bearing on the types of product extracted from the forest, total amount of forest income earned and share of forest income, and for what purpose certain socioeconomic and demographic groups rely on forests. In standard HH_Module A1, the identity (age, years of education and gender) of the main collector/processor of the forest (question 1.2) or processed (1.16) product is captured, in that it is linked to the household basic information table or to the standard LSMS household survey table where appropriate. Importantly, this can differentiate in what way different socio-demographic groups can exploit various products. Questions 1.3 and 1.17 also note how many household members were involved in collection or processing.

Labour effort in terms of hours, days and weeks for collection (1.5) and processing (1.18) of products is also documented, highlighting the value of family labour that could be expended in collection and processing activities.

Importantly, data from these sections can help to answer questions such as:

- How does the value of products collected or processed differ among categories such as gender, age, education level, and/or occupation?
- Are such products used mainly for subsistence or for sale?
- What is the approximate amount of family labour expended in collection or processing activities? And how does this compare with other income alternatives?

Origin of products

The origin of products is also a cross-cutting theme, and can flag the areas where products are collected, which can importantly highlight the sustainability of the resource base.

Data on origin of products are collected by product in HH_Module A1 on income (question 1.4), HH_Module C2 on shocks and crises (question 2.6), highlighting the origin of products used to help households recover from shock, as well as HH_Module D2 on forest clearance (question 2.13), marking the type of land where forest is cleared and COM_Module B on the most important forest and wild products regarding where MIPs were sourced (question 2).

INTEGRATED MODULES: ADDING FORESTRY ASPECTS TO PRE-EXISTING LIVING STANDARDS MEASUREMENT STUDY SURVEYS

The integrated modules are a set of additional questions on forestry and wild products that can be appended to existing sections of the LSMS questionnaires at both the household and community levels. As country variations in module style and arrangement exist, country-specific adjustments may be needed to ensure there is a proper flow. These modules collect the minimum information needed to understand forest and wild product use in households where forest reliance is probably of intermediate extent, but unlikely

to be a dominant aspect of livelihood strategies – and hence the use of the full forestry modules may *ex ante* not be justified.

Importantly, this section documents the extent of forest resource use down the supply chain, where collection is limited but consumption remains, as in the case of fuelwood, charcoal and other NTFPs. The implementation of the integrated modules would also be suitable in urban areas, where forest products are consumed and occasional collection of products occurs, e.g. on weekends. To exemplify how one can add forestry aspects to pre-existing LSMS surveys, we use the Malawi[18] and United Republic of Tanzania[19] LSMS surveys.

Questions to be integrated with household questionnaires

Food consumption over past week

This section of the LSMS survey incorporates various kinds of staple foods (e.g. cereals, grains), fats/oil, sugar and spices, fruits and vegetables, meat, fish and animal products, milk and milk products, as well as other beverages. Questions regarding supplementary forest products need to be added as codes within the section on consumption of food over past (one) week, although a few are already incorporated (e.g. wild vegetables, birds and insects). Whereas origin of products cannot be explored, inclusion of this forest-related component will allow the minimum documentation of consumption of raw and processed forest products by households that are not necessarily engaged in forest collection activities. Currently the section collects data on the quantity consumed and prices paid for each product, and will give an overview of the distribution of forest product use in the country, as well as volume and value of use.

Health

In the health section, a question asking for household total expenditure (cash and in kind) *on medicinal plants* over the past four weeks is added. This is to supplement the existing sections that investigate details of household visits to health providers, gross expenditure on illness/injuries, preventive healthcare/body check-ups, etc., and non-prescription medicines, as well as hospital stays.

Labour

In the labour section, existing questions on whether household members engaged in any agricultural activity in the last 12 months should include the option *harvesting of forest products*. Generally, this section in the LSMS surveys will document (1) whether a household member has taken part in such an activity, and (2) whether the products collected were sold or consumed. Data on quantities collected are not captured here, as

[18] http://siteresources.worldbank.org/INTSURAGRI/Resources/7420178-1294154327242/IHS3.Household.Qx.FINAL.pdf.

[19] http://siteresources.worldbank.org/INTSURAGRI/Resources/7420178-1294154345427/NPS_Household_Qx_Y3_Final_English.pdf.

they are in the forestry modules, and users should implement Section A1: Income in the forestry modules if quantification of volumes collected is of interest. General questions on time use on agricultural activities should append the *harvesting of forest products*, which asks about the number of months, weeks per month, days per week, and hours per day spent on this activity. This added forest-related dimension will complement the existing questions on time use and labour in agriculture, livestock raising, and fishing activities.

Business benefits

Business benefits gained from forestry will probably be captured in the existing LSMS sections, ensuring that relevant codes for forest-related enterprises are added to the section on household enterprise. This section currently records household income, expenses and value of stock from non-agricultural business (e.g. auto-mechanics, restaurants, transport) and professions, and forest-product processing, as well as who is involved in management and ownership.

Assets

The existing LSMS section on assets will be sufficient to capture forest-related implements, provided that necessary codes to capture forest-related assets are assigned to the standard LSMS household survey (for example, chainsaw, shotgun, etc.).

Other income

Payments from a variety of forest service schemes are to be incorporated into the codes of the "other income" question in the existing LSMS finance section, to supplement existing income data sourced from incoming transfers/gifts from friends/relatives, pensions and investments, rental or sale of assets, and others such as inheritance and lottery. The codes to be added include (1) payment for ecotourism, (2) payment for carbon sequestration/REDD+ scheme, (3) payment from biodiversity conservation programme, (4) payment from watershed protection programme, (5) payment for use of forest (e.g. from timber or mining company), and (6) other forest-related support (e.g. free seedlings, forestry implements, growth/protection inputs).

Non-food expenditures

Under the non-food expenditures section, aspects of energy (charcoal) and construction (wood poles and thatching) are included, but this can be expanded to include woodfuel.

Food security

Additional questions on consumption of forest products during food shortage are to be inserted into the food security section. This will supplement existing LSMS questions on household experiences with food shortage over the past one week/year and the number of days (during the past seven days) when different responses have been taken to deal with the situation, such as reduction in food intake/portion size, particularly of adults, and reliance on others (e.g. family, friends) for help. Specifically, the suggested forest-related questions will collect data on (1) whether forest products

are used to meet food shortage, (2) which forest products are used, and (3) importance of relying on forest and wild products compared with other coping strategies. The data then make it possible to assess if certain forest products are only consumed during low food availability. This helps to pinpoint any importance of forest and wild products in alleviating food shortage.

Shocks and coping strategies

Forest-related coping responses are added as codes in the section on shocks and coping strategies, to collect data on how consumption or sale of forest products has mitigated shocks and crises in the past five years. The existing LSMS section has currently examined a number of other coping alternatives, including diverse sources of external assistance, distress sale of varied types of assets, change of eating patterns, search for alternative employment, withdrawing children from school, and spiritual exercises.

Questions to be integrated with community questionnaires

To exemplify the addition of questions to be integrated with community questionnaires, we use the Malawi Third Integrated Household Survey – community questionnaire unless otherwise specified.

Economic activities

Forest-related activities can be inserted as extra codes into the available list of codes under economic activities, where the most important sources of employment for the community are examined. Diverse practices for livelihoods have already been incorporated under the economic activities section, including farming, fishing, trade/industry/service provision, transport and professional/governmental occupations. While forest-related activities, such as sale of fuelwood/charcoal and handicraft production, are considered in some cases, sale of other forest products (e.g. timber, medicinal plants, forage, wild foods and aquatic products) and hunting can be added as codes.

Trends of resources

The section on changes examines alterations in the condition of the community resulting from changed availability of various resources. Questions examining the availability of fuelwood and charcoal already exist, together with other enquiries into the availability of varied basic infrastructure, health care services and social environment within the community. However, changes in availability of forest resources (timber, medicinal plants, wild foods and animals) and access to forest are to be added to the codes of the changes section.

Forest product collection

The section on agriculture currently looks at the various dimensions of harvesting and planting of agricultural crops. A section could be appended here to briefly ask about the three most important forest and wild products for the community.

Units and pricing

In the Tanzania National Panel Survey 2012–2013 community questionnaire the sections on market prices and local units could incorporate the important forest and wild products that are most commonly used. When the separate forestry modules are not implemented and identification of most common and important forest and wild products is not done in the community module, the identification of commonly used forest and wild products can be done through a key informant interview.

The field team for testing the forestry modules in Indonesia (from left: Indah, Kharisma, Firmus, Willy).

© N. HOGARTH

5. Operationalizing the forestry modules

Prior to using the forest instruments as an add-on to an existing national survey, it is important to realign objectives of a module with the existing national survey. For example, in national surveys with broader objectives to collect national-level data on living standards, such as the LSMS surveys, it may often be necessary to implement the entirety of the forestry modules. Other users with more specific interests may choose to implement certain modules, complemented with information already available from existing databases or other information sources.

There are, however, limitations to the quality and extent of forest-related data that can be collected in a household survey, which relate to its scope and operationalization (e.g. sampling methods and recall periods, see below). This section broadly introduces users to aspects that need to be considered when implementing the separate forestry modules.

FIELD-TESTING

The forestry modules have been field-tested in three countries – Indonesia, United Republic of Tanzania and Nepal (Table 3). Each of them rigorously tested all modules and the modules were subsequently improved and tested again in the next country. Valuable lessons from country field tests have informed the development of sections of the forestry modules and these field tests have resulted in this final version. A summary of the field tests is given in Annex G. Full-length reports of the field tests describe the specific challenges of operationalizing the modules in Indonesia (Bong *et al.*, 2016), United Republic of Tanzania (Persha, 2015) and Nepal (Karna, 2015).

TABLE 3
Details of field tests in Indonesia, United Republic of Tanzania and Nepal

Data	Indonesia	United Republic of Tanzania	Nepal
Questionnaire type	Paper	Paper	Tablet
Modules tested	All	All	All
Geographical area	Kalis subdistrict, Kapuas Hulu district in West Kalimantan province, Indonesia	Kilwa district in Lindi region; Lushoto district in Tanga region	Parbat district of Mid-Western hill region
Sample size (number of communities)	4 hamlets	5 communities	20 communities
Household sample	120 households	188 households	200 households

Table 3 continues on next page

Table 3 continued

Data	Indonesia	United Republic of Tanzania	Nepal
Sampling rate (number of sampled/total population)	47 percent	Varies	Approximately 10 percent
Average length of time to implement all HH modules	1 hour 50 minutes	1 hour 28 minutes	1 hour
Field team	1 project leader 1 field coordinator 3 enumerators	1 field coordinator 2 field supervisors 8 enumerators	1 project leader 2 enumerators
Household selection	Random using lists	Random, excluding HHs consisting of only elderly members	Stratified sampling according to wealth group
General area description	Remote, hilly and mountainous, tropical rainforest	Lowland *miombo* woodlands, coastal and mangrove forests, upland and montane forests	Hilly, high- and low-altitude forest
Main forest uses and other land use	Swidden agriculture, fishing, forest fruits, rattan, tubers, hunting, logging, rubber	Agriculture, logging, charcoal, construction materials, fuelwood, medicinal plants, fruits	Fuelwood, timber, leaf litter, timber, medicinal plants and food plants

Specific technical guidance for implementation of each section of the module is given in Table 3 associated with this sourcebook (Bakkegaard *et al*., 2016a).

SCOPE, FOCUS AND LIMITATIONS OF DATA COLLECTION

The focus and scale of any data collection will be conditioned by the objective of the study, ranging from a targeted local-scale intervention in a particular site to national-level surveys to examine contributions of forest products to GDP. The modular form of the forestry modules is designed to cater for diverse needs, and importantly also to complement other modules in the LSMS series.

Surveys of living standards often have a multi-topic focus, covering several components or indicators that together allow a broad measurement of living standards: income, health, food security, access to public services, etc. Just as in specialized surveys, forest-related questions are relevant to many of the possible components of a living standard. Specific forest-related questions can either be integrated with specific survey modules or be implemented as a set of separate modules that cover forest and wild products across the various themes in Section 4 that relate to household living standards and welfare. Implementing a separate forestry module is more time-consuming, as it entails adding an extra survey component to what may already be a large survey, but has the advantage of collecting the detailed data on forest and environmental resources necessary to inform policy and decision-makers, as well as clarifying the role of forests in livelihoods.

This kind of household survey approach suffers limitations. First, the household surveys mainly collect quantitative data and realized values (usually of products) from forests and other environments, such as the material benefits and contributions to household welfare (Kepe, 2008), but surveys will not catch the more qualitative

information, such as sensitive or highly contextual information on, for example, the local institutional arrangements regarding resource use. In this case the survey can be supplemented with qualitative data-collecting methods, described in numerous textbooks such as Denscombe (2010), Berg and Lune (2004) and Cundill *et al.* (2011). Related to this, a household survey may miss the complete picture of how collection, processing and trade of forest and wild products functionally add value to different actors along a product value chain, which can be done through a value chain survey (Jagger and Angelsen, 2011). This involves a survey of all actors along the value chain regarding their expenditures for purchasing and possibly processing, packaging, transporting and marketing the product, and the income from selling the product or from providing a service relating to the processing-marketing chain (e.g. charcoal value chain in Senegal; Ribot, 1998).

Operationalizing the modules in the field includes many general considerations, which are thoroughly discussed in Angelsen *et al.* (2011). These may include issues on selecting the study site, sample frame, approaching and choosing respondents along with other aspects of fieldwork. The sampling and other relevant aspects of survey implementation might depend on whether the modules are implemented as part of LSMS surveys or not. Information for making decisions on such considerations are available from many sources.[20]

Enumerator training

Training is an essential step prior to survey implementation to ensure a common understanding of the objectives of the survey, consistency of the information being collected, questions being asked and explanation of difficult concepts, as well as interview and data-recording techniques. Jagger *et al.* (2011) provide a detailed description of the practical issues of hiring, training and managing enumerators. Importantly, if several teams are going to the field at once, it is beneficial for all teams to have been trained by the same person in order to ensure consistency in data collection or at least the same well-described materials. Role play is also beneficial for enumerators to practice their interview skills. In order to assist in training and guidance of the enumerators, a separate field manual has been developed in conjunction with this sourcebook (Bakkegaard *et al.*, 2016a).

Quality control and testing

Pre-testing of the questionnaire is imperative, being useful not only for enumerators to gain more practical experience, but also for adjusting and improving the questionnaire in the local context and according to respondents' ability to understand and answer questions. Particularly, when questionnaires are translated into local languages, it is essential to test the wording of the questions so that they make sense locally, while remaining consistent with the original meaning.

[20] For example at http://unstats.un.org/unsd/hhsurveys/pdf/Household_surveys.pdf, http://go.worldbank.org/E0QUSB5XB0, and http://lsms.adeptanalytics.org/course/fscommand/session3/Ses3_eng.html.

Adequate time also needs to be devoted to data-checking – preferably daily, to ensure that the questionnaires are filled out correctly, and that the answers make sense and are legible to data enterers. This is mainly for questionnaire surveys carried out on paper. During this process, data problems can be detected, marked and addressed in time in the field by recalling interviews or revisiting households. Close communication with enumerators is critical and this requires closely engaging in fieldwork and actively listening to enumerator feedback and making suggestions to improve the survey.

For LSMS users, concurrent data entry or computer assisted field entry (CAFE) are recommended. The data-entry software is developed and tested ahead of the survey, and the survey team includes a data-entry operator; data are entered at the end of each day so that they can be verified while the team is still on site and can correct problematic information. For non-LSMS users, data can be entered into electronic databases, such as Microsoft Excel or Access. Short programs can be developed that quality-test the data, such as controlling for double entries, empty records, data gaps, and data inconsistencies such as total household income differing substantially from income recorded for individual income streams. Whereas the programs may detect problems, correction of data has to be done manually by reviewing the original paper survey record. FAO (2011) has developed a training manual with examples of queries to control time-series databases in Microsoft Access.

Use of tablets in the field

With the widespread use of tablets, software has recently been developed that allows for data entry while the interview or questionnaire survey is being carried out. This opens up more cost-effective data collection that is also less prone to data-entry mistakes if the computer program or application has been set up correctly.

Mobile data-collection tools in the form of apps for tablets are available as open source, freeware and licensed applications. This includes the Collect Mobile app developed by Open Foris,[21] an FAO-led initiative, and Survey Solutions[22] developed by the World Bank and FAO. Collect Mobile was used for the forestry module field test in Nepal. The apps differ in their user-friendliness, ability to enter complex lines of questioning (such as large tables), and flexibility in adjusting the software to specific needs. Interview questions can be set up in a format that is easy to read and handle for enumerators in the field. Answers can be typed in directly during the interview, either as free text or selection of pre-defined answers in a drop-down list or in bullets, and entries may be limited to numbers (e.g. age) or text (e.g. names), and certain questions may only be open for answers contingent on earlier answers; for example if the respondent answers "no" to having a partner, all questions regarding a spouse will not appear. The tablet's global positioning system (GPS) will automatically relate each interview with a geographical location, and other spatial data can be added, such as farm perimeter. These features ensure more immediate control of the data and their automated validation. Furthermore, data

[21] http://www.fao.org/forestry/fma/openforis/en/

[22] http://www.worldbank.org/en/events/2015/06/08/survey-solution

are stored instantly in a database, thus removing the time and costs of data entry, which can be a lengthy process. If the tablet can access the Internet, data can be uploaded in real time to a cloud-based storage solution, and a third person can oversee and quality-check the data entry in real time. Further supervision and quality control of enumerators can be done with the use of the tablet's GPS, tracking the location and route, and even the camera and microphone can be activated at distance, though full and prior knowledge of the enumerators and respondents should be assured in such cases.

The use of tablets in the field also presents some challenges. Battery life is a problem for tablet use if the fieldwork takes place for prolonged periods in areas with insufficient electricity supply. Solutions include power stations for charging the battery on-the-go and solar-powered battery chargers. Tablet use also requires a certain time investment in terms of getting to know the application and programming of the questionnaire, so it is important to allow enough time prior to fieldwork to adjust and fix the programs prior to survey implementation. Training enumerators accordingly may be a considerable time investment, especially when they have little experience of tablets. Finally, an enumerator with a tablet may find it harder to create positive relationships with respondents, or be met with distrust, even if – or perhaps especially if – the respondent is familiar with the audio, video and tracking features of a tablet.

Good-quality tablets are now in a price range where purchasing them for even a large field team is manageable; the reduced cost of not having to enter data manually is bound to offset the investment.

Assorted fruits and vegetables from forests. Clockwise from top left: Gendang *leaves and* lepang *fruits,* Jamur kuping *(jelly ear mushroom), fern,* red beng *and* tohek *fruits (Indonesia).*

© I.W. BONG AND W.A. DAEL

Housing raised on stilts for protection from floods and wild animals (Indonesia).

© I.W. BONG

6. Conclusions

Forests can provide important provisioning, supporting, regulating and cultural services for households and communities. They are often important sources of food, fodder and construction materials, as well as sources of energy and medicines. Generally, they provide a wide array of benefits to household welfare that encompass direct product-based income (for subsistence and sale), wage and business benefits, and environmental services, among others, while playing a vital role in supporting households in times of need. Until recently, these contributions of forest and wild products have been systematically overlooked, or included with agricultural data. However, results from a variety of studies indicate that environmental incomes, i.e. extraction from natural forest and non-forest wildlands, in many rural areas of developing countries may contribute just as much income to smallholder household livelihoods as agricultural crops. However, these foraging strategies typically include a wider array of products than for agricultural crops, and the share of subsistence uses is larger. Thus forest and environmental incomes are undoubtedly important welfare components, but it is more challenging for them to become properly quantified. This sourcebook and the questionnaire modules that follow are intended to help meet the challenge of registering the sources of household welfare in a more exhaustive way, giving a better understanding of what triggers variations in time and space, and what policies and interventions are needed to make the best use of forest potential.

Due to the sparse inclusion to date of forest and wild product-related aspects in nationally implemented surveys, their contribution has largely gone unrecorded, and therefore has been under-represented in national policy and decision-making. Enumerating these income sources is hence the first step in remedying these shortcomings. The overall purpose of this sourcebook is to guide the use of forestry modules in LSMS-type surveys at national level, whereby the separate and integrated forestry modules can be used with the existing LSMS household and community questionnaires. Importantly, it also provides options for non-LSMS users to choose and implement relevant forestry modules and capture the data necessary to make sound judgements on forest and wild product contributions to local communities and households. Finally, in addition to choosing whether to implement the integrated or the separate forestry modules, LSMS users are provided with extended modules at household and community levels that delve into specific themes where forest and wild products may feature prominently. This flexibility in selecting modules will hopefully give users the tools to obtain information customized to their objectives.

Perupuk *leaves (a type of pandan). Villagers in Rantau Bumbun (Indonesia)* *collect* perupuk *from the forest to make baskets and mats.*

© N. HOGARTH

© N. HOGARTH

References

Adam, Y.O., Pretzsch, J. & Pettenella, D. 2013. Contribution of non-timber forest products livelihood strategies to rural development in drylands of Sudan: potentials and failures. *Agr. Syst.*, 117: 90–97.

Adhikari, B., Di Falco, S. & Lovett, J.C. 2004. Household characteristics and forest dependency: evidence from common property forest management in Nepal. *Ecol. Econ.*, 48(2): 245–257.

Agrawal, A., Chhatre, A. & Hardin, R. 2008. Changing governance of the world's forests. *Science*, 320(5882): 1460–1462.

Angelsen, A. & Wunder, S. 2003. *Exploring the forest–poverty link: key concepts, issues and research implications*. Bogor, Indonesia, Center for International Forestry Research (CIFOR).

Angelsen, A., Larsen, H.O., Lund, J.F., Smith-Hall, C. & Wunder, S., eds. 2011. *Measuring livelihoods and environmental dependence. Methods for research and fieldwork*, pp. 163–174. London, Earthscan.

Angelsen, A. & Lund, J.F. 2011. Designing the household questionnaire. *In* A. Angelsen, H.O. Larsen, J.F. Lund, C. Smith-Hall & S. Wunder, eds. *Measuring livelihoods and environmental dependence. Methods for research and fieldwork*, pp. 107–126. London, Earthscan.

Angelsen, A., Jagger, P., Babigumira, R., Belcher, B., Hogarth, N.J., Bauch, S., Børner, J., Smith-Hall, C. & Wunder, S. 2014. Environmental income and rural livelihoods: a global-comparative analysis. *World Dev.*, 64: S12–S28.

Babulo, B., Muys, B., Nega, F., Tollens, E., Nyssen, J., Deckers, J. & Mathijs, E. 2009. The economic contribution of forest resource use to rural livelihoods in Tigray, Northern Ethiopia. *Forest Pol. Econ.*, 11(2): 109–117.

Bakkegaard, R.K. 2013. *CIFOR PEN survey analysis consultancy report*. December 2013.

Bakkegaard, R.K. 2014. *Regional analysis of forest and environmental product use and dependence amongst rural households in South Caucasus, Eastern Europe and Russia.* Final report. November 2014. Gland, Switzerland, International Union for Conservation of Nature

Bakkegaard, R.K., Agrawal, A., Animon, I., Bosselmann, A., Hogarth, N., Miller, D., Persha, L., Rametsteiner, E., Wunder, S. & Zezza, A. 2016a. *National socioeconomic surveys in forestry: field manual.* Food and Agriculture Organization of the United Nations, Center for International Forestry Research, International Forestry Resources and Institutions Research Network, World Bank.

Bakkegaard, R., Nielsen, M.R. & Thorsen, B.J. 2016b. Household determinants of bushmeat and eru (*Gnetum africanum*) harvesting for cash in the Democratic Republic of Congo. *Environ. Dev. Sustain*. doi:10.1007/s10668-016-9812-9.

Bandyopadhyay, S., Wang, L. & Wijnen, M. 2011. Improving household survey instruments for understanding agricultural household adaptation to climate change: water stress and variability. Washington, DC, World Bank (available at http://siteresources.worldbank.org/INTSURAGRI/Resources/7420178-1294259038276/Adaptation_to_Climate_Change_Water_Stress.pdf).

Beckett, M., DaVanzo, J., Sastry, N., Panis, C. & Peterson, C. 2001. The quality of retrospective data. An examination of long-term recall in a developing country. *J. Hum. Resour.*, 36(3): 593–625.

Béné, C., Chijere, A.D.G., Allison, E.H., Snyder, K. & Crissman, C. 2012. *Design and implementation of fishery modules in integrated household surveys in developing countries.* Document prepared for the Living Standards Measurement Study – Integrated Surveys on Agriculture project. Penang, Malaysia, WorldFish Center.

Berg, B.L. & Lune, H. 2004. *Qualitative research methods for the social sciences*. Vol. 5. Boston, Mass., Pearson.

Bong, I.W., Hogarth, N.J. & Wunder, S. 2016. *Pilot testing the up-scaled forestry module and sourcebook for the LSMS-ISA Indonesia*. CIFOR Bogor, Indonesia.

Brück, T., Justino, P., Verwimp, P. & Tedesco, A. 2013. Measuring conflict exposure in micro-level surveys. LSMS ISA tools (available at http://siteresources.worldbank.org/INTSURAGRI/Resources/7420178-1294259038276/Measuring_Conflict_in_Micro_Level_Surveys.pdf) .

Byron, N. & Arnold, M. 1999. What futures for the people of the tropical forests? *World Dev.*, 27(5): 17.

Cavendish, W. 2000. Empirical regularities in the poverty-environment relationship of rural households: evidence from Zimbabwe. *World Dev.*, 28(11): 25.

Cavendish, W. 2002. Quantitative methods for estimating the value of resource use to household income. *In* B. Campbell & M.K. Luckert, eds. *Uncovering the hidden harvest*, pp. 17–65. London, Earthscan Publications Ltd.

Chidumayo, E.N. & Gumbo, D.J. 2013. The environmental impacts of charcoal production in tropical ecosystems of the world: a synthesis. *Energy Sustain. Develop.*, 17(2): 86–94.

Chokkalingam, U. & de Jong, W. 2001. Secondary forest: a working definition and typology. *Int. Forestry Rev.*, 3(1): 19–26.

Chukwuone, N.A. & Okeke, C.A. 2012. Can non-wood forest products be used in promoting household food security? Evidence from savannah and rain forest regions of Southern Nigeria. *Forest Policy Econ.*, 25: 1–9.

CIFOR. 2007. *PEN technical guidelines* (available at http://www.cifor.org/pen/research-tools/the-pen-technical-guidelines.html). Accessed 20 July 2008.

CIFOR. 2008. *PEN prototype questionnaire* (http://www.cifor.org/pen/research-tools/the-pen-prototype-questionnaire.html).

CIFOR. 2014. *PEN code list* (available at http://www1.cifor.org/fileadmin/subsites/PEN/doc/PEN_Codes_Version_7.7_February_2014.pdf). Accessed 30 January 2015.

Clarke, J., Cavendish, W. & Coote, C. 1996. Rural households and *miombo* woodlands: use, value and management. *In* B.M. Campbell, ed. *The* miombo *in transition: woodlands and welfare in Africa*, pp. 101–136. Bogor, Indonesia, CIFOR.

Cocks, M.L., Bangay, L., Shackleton, C.M. & Wiersum, K.F. 2008. "Rich man poor man" – inter-household and community factors influencing the use of wild plant resources amongst rural households in South Africa. *Int. J. Sust. Dev. World Ecol.*, 15(3): 198–210.

Cundill, G., Shackleton, S. & Larsen, H.O. 2011. Collecting contextual information. *In* Angelsen, A., Larsen, H.O., Lund, J.F., Smith-Hall, C. & Wunder, S., eds. *Measuring livelihoods and environmental dependence. Methods for research and fieldwork*, pp. 71–88. London, Earthscan.

de Merode, E., Homewood, K. & Cowlishaw, G. 2004. The value of bushmeat and other wild foods to rural households living in extreme poverty in Democratic Republic of the Congo. *Biol. Conserv.*, 118(5): 573–581.

de Vries, S., Verheij, R.A., Groenewegen, P.P. & Spreeuwenberg, P. 2003. Natural environments–healthy environments? An exploratory analysis of the relationship between greenspace and health. *Environ. Plan. A*, 35(10): 1717–1732.

Delang, C.O. 2006. Not just minor forest products: the economic rationale for the consumption of wild food plants by subsistence farmers. *Ecol. Econ.*, 59(1): 64–73.

Denscombe, M. 2010. *Good research guide: for small-scale social research projects*. 4th edn. Berkshire, UK, Open University Press, McGraw-Hill Education.

Dercon, S. 2002. Income risk, coping strategies, and safety nets. *World Bank Res. Obs.*, 17(2):141–166.

Deressa, T.T., Hassan, R.M. & Ringler, C. 2011. Perception of and adaptation to climate change by farmers in the Nile basin of Ethiopia. *J. Agri. Sci.*, 149(01): 23–31.

FAO. 1990. *The major significant of "minor" forest products: the local use and value of forests in the West African humid forest zone*, by J. Falconer, ed. Rome, C.R.S. Koppell.

FAO. 2000. *Asia-Pacific Forestry Commission: Development of national-level criteria and indicators for the sustainable management of dry forests of Asia: Workshop Report.* Annex 6: definitions and basic principles of sustainable forest management in relation to criteria and indicators (available at http://www.fao.org/docrep/003/x6896e/x6896e0e.htm). Accessed 5 January 2016.

FAO. 2002. *Land tenure and rural development. FAO Land Tenure Studies 3.* Rome (available at ftp://ftp.fao.org/docrep/fao/005/y4307E/y4307E00.pdf). Accessed 9 March 2014.

FAO. 2006. *Global forest resources assessment 2005*. Rome.

FAO. 2011. *MS Access queries for database quality control for time series.* Rome (available at http://www.fao.org/nr/water/faonile/products/Docs/Manuals/MS_Access_queries_for_Database_Quality_Contol.pdf).

FAO. 2012. FRA 2015 Terms and definitions. Forest Resources Assessment Working Paper 180 (available at http://www.fao.org/docrep/017/ap862e/ap862e00.pdf). Accessed 20 June 2016.

FAO. 2013a. *NAFORMA socioeconomic data*. FOM Internal draft report. November 2013.

FAO. 2013b. *Review of forest-related variables in LSMS countries*. FOE internal report.

FAO. 2014a. *State of the World's Forests 2014. Enhancing the socioeconomic benefits from forests*. Rome (available at http://www.fao.org/3/a-i3710e.pdf).

FAO. 2014b. Finland-FAO Forestry Programme website (available at http://www.fao.org/forestry/fma/76453/en/). Accessed 21 March 2015.

FAO. 2014c. *Glossary (list).* FAOSTAT. Online at: www.faostat.fao.org. Accessed 21 March 2015.

Fisher, M. 2004. Household welfare and forest dependence in Southern Malawi. *Environ. Dev. Econ.*, 9(2): 135–154.

Fisher, B., Kulindwa, K., Mwanyoka, I., Turner, R.K. & Burgess, N.D. 2010a. Common pool resource management and PES: lessons and constraints for water PES in Tanzania. *Ecol. Econ.*, 69(6): 1253–1261.

Fisher, M., Reimer, J.J. & Carr, E.R. 2010b. Who should be interviewed in surveys of household income? *World Dev.*, 38(7): 966–973.

Fonta, W.M., Ichoku, H.E. & Ayuk, E. 2011. The distributional impacts of forest income on household welfare in rural Nigeria. *J. Econ. Sustain. Dev.*, 2(2): 1–13.

Gbetibouo, G.A. 2009. *Understanding farmers' perceptions and adaptations to climate change and variability: The case of the Limpopo Basin, South Africa*. Vol. 849. International Food Policy Research Institute.

Godoy, R. & Contreras, M. 2001. A comparative study of education and tropical deforestation among Lowland Bolivian Amerindians: forest values, environmental externality, and school subsidies. *Econ. Dev. Cult. Change*, 49(3): 555–574.

Gonzalez, P., Tucker, C.J. & Sy, H. 2012. Tree density and species decline in the African Sahel attributable to climate. *J. Arid Environ.*, 78: 55–64.

Grosh, M. & Glewwe, P. 2000. *Designing household survey questionnaires for developing countries: Lessons from 15 years of the Living Standards Measurement Study.* Vol. 2. Washington, DC, World Bank.

Heltberg, R. 2004. Fuel switching: evidence from eight developing countries. *Energ. Econ.*, 26(5), 869–887.

Heubach, K., Wittig, R., Nuppenau, E.A. & Hahn, K. 2011. The economic importance of non-timber forest products (NTFPs) for livelihood maintenance of rural West African communities: a case study from Northern Benin. *Ecol. Econ.*, 70(11): 1991–2001.

Himelein, K., Menzies, N. & Woolcock, M. 2010. Surveying justice: a practical guide to household surveys. Justice and Development Working Paper 11. Washington, DC, World Bank (available at http://documents.worldbank.org/curated/en/2010/01/12600211/surveying-justice-practical-guide-household-surveys).

Hogarth, N.J., Belcher, B., Campbell, B. & Stacey, N. 2013. The role of forest-related income in household economies and rural livelihoods in the border-region of Southern China. *World Dev.*, 43: 111–123.

IFAD. 2011. *Rural Poverty Report 2011: New realities, new challenges, new opportunities for tomorrow's generation*. Rome, International Fund for Agricultural Development.

IPCC. 2001. *Technical summary: Climate Change 2001: Impacts, adaptation, and vulnerability.* A report of Working Group II of the Intergovernmental Panel on Climate Change. Geneva, Switzerland.

IPCC. 2013. *Fifth assessment report. Glossary* (available at https://www.ipcc.ch/pdf/assessment-report/ar5/wg2/drafts/fd/WGIIAR5-Glossary_FGD.pdf) Accessed 20 July 2014.

IUCN. 2010. *About biodiversity*. Gland, Switzerland, International Union for Conservation of Nature (available at http://iucn.org/iyb/about/). Accessed 15 March 2014.

Jagger, P. 2010. Forest sector reforms, livelihoods and sustainability in Western Uganda. *In* L. German, A. Karsenty & A.M. Tiani, eds. *Governing Africa's forests in a globalized world*, pp. 103–125. London, Earthscan.

Jagger, P. & Angelsen, A. 2011. The division of labour between village, household and other surveys. *In* A. Angelsen, H.O. Larsen, J.F. Lund, C. Smith-Hall & S. Wunder, eds. *Measuring livelihoods and environmental dependence. Methods for research and fieldwork*, pp. 89–106. London, Earthscan.

Jagger, P., Duchelle, A., Overgaard Larsen, H. & Nielsen, Ø.J. 2011. Chapter 10: Hiring, training and managing a field team. *In* A. Angelsen, H.O. Larsen, J.F. Lund, C. Smith-Hall & S. Wunder, eds. *Measuring livelihoods and environmental dependence. Methods for research and fieldwork*, pp. 163–174. London, Earthscan.

Jagger, P. 2012. Environmental Income, Rural Livelihoods and Income Inequality in Western Uganda. *Forests, Trees and Livelihoods* 21(2): 1–15.

Kamanga, P., Vedeld, P. & Sjaastad, E. 2009. Forest incomes and rural livelihoods in Chiradzulu District, Malawi. *Ecol. Econ*., 68(3): 613–624.

Karna, B. 2015. *LSMS Pilot Testing Report from Nepal*. Final Report.

Kepe, T. 2008. Beyond the numbers: understanding the value of vegetation to rural livelihoods in Africa. *Geoforum*, 39(2): 958–968.

Leftwich, A. & Sen, K. 2010. *Beyond institutions: Institutions and organizations in the politics and economics of poverty reduction – Thematic synthesis of research evidence.* DFID-funded Research Programme Consortium on Improving Institutions for Pro-Poor Growth (IPPG). Manchester, UK, University of Manchester.

Locatelli, B., Evans, V., Wardell, A., Andrade, A. & Vignola, R. 2011. Forests and climate change in Latin America: linking adaptation and mitigation. *Forests*, 2(1): 431–450.

LSMS-ISA. 2011. *Improving household survey data on agriculture in sub-Saharan Africa* (available at http://siteresources.worldbank.org/INTSURAGRI/Resources/LSMS-ISA_4Pager.pdf). Accessed 26 November 2013.

Luckert, M.K. & Campbell, B.M., eds. 2012. *Uncovering the hidden harvest: valuation methods for woodland and forest resources*. Routledge.

Lund, J., Shackleton, S. & Luckert, M. 2011. Chapter 11: Getting Quality Data. *In* A. Angelsen, H.O. Larsen, J.F. Lund, C. Smith-Hall & S. Wunder, eds. *Measuring livelihoods and environmental dependence. Methods for research and fieldwork* (1st ed., pp. 163–174). London, Earthscan.

Lundgren, B.O. & Raintree, J.B. 1982. Sustained agroforestry. *In* B. Nestel, ed. *Agricultural research for development: potentials and challenges in Asia*, pp. 37–49. The Hague, Netherlands, ISNAR.

MA. 2005. *Millennium Ecosystem Assessment. Ecosystems and human well-being. Synthesis.* Washington, DC, World Resources Institute, Island Press.

Maddison, D. 2007. The perception of and adaptation to climate change in Africa. Working Paper 4308. Washington, DC, World Bank.

Mahanty, S., Suich, H. & Tacconi, L. 2013. Access and benefits in payments for environmental services and implications for REDD+: lessons from seven PES schemes. *Land Use Policy*, 31: 38–47.

Mamo, G., Sjaastad, E. & Vedeld, P. 2007. Economic dependence on forest resources: a case from Dendi District, Ethiopia. *Forest Pol. Econ.*, 9(8): 916–927.

Maselli, D., Rueff, H. & Wiesmann, U. 2011. Indigenous fodder trees can increase grazing accessibility for landless and mobile pastoralists in northern Pakistan. *Pastoralism: Res. Pol. Prac.*, 1(2): 1–20.

McCarthy, N. 2011. *Agricultural household adaptation to climate change: Land investment and management*. Washington, DC, World Bank (available at http://siteresources.worldbank.org/INTSURAGRI/Resources/7420178-1294259038276/Adaptation_to_Climate_Change_Land_Management.pdf).

Menzies, N.K. 2007. *Our forest, your ecosystem, their timber. Communities, conservation, and the state in community-based forest management*. New York, Columbia University Press.

Mertz, O., Mbow, C., Reenberg, A. & Diouf, A. 2009. Farmers' perceptions of climate change and agricultural adaptation strategies in rural Sahel. *Environ. Manag.*, 43(5): 804–816.

Millar, C.I., Stephenson, N.L. & Stephens, S.L. 2007. Climate change and forests of the future: managing in the face of uncertainty. *Ecol. Appl.*, 17: 2145–2151.

Missouri Botanical Garden. 2002. *Rivers and streams* (available at http://www.mbgnet.net/fresh/rivers/shed.htm). Accessed on 20 July 2015.

Nair, P.K.R. 1993. An introduction to agroforestry. ICRAF World Agroforestry Centre. Dordrecht, Netherlands.

Nielsen, T.S. & Hansen, K.B. 2007. Do green areas affect health? Results from a Danish survey on the use of green areas and health indicators. *Health & Place*, 13(4): 839–850.

Noack, F., Wunder, S., Angelsen, A. & Börner, J. 2015. Responses to weather and climate: a cross-section analysis of rural incomes. Policy Research Working Paper 7478. Washington, DC, World Bank. (Commissioned background paper for Shock Waves: Managing the Impacts of Climate Change on Poverty, 54 pp.)

North, D.C. 1990. *Institutions, institutional change and economic performance*. Cambridge, UK, Cambridge University Press.

Osemeobo, G.J. 2005. Living on the forests: women and household security in Nigeria. *Small-scale Forest Econ. Manag. Pol.*, 4(3): 343–357.

Ostrom, E. 1999. Coping with tragedies of the commons. *Annu. Rev. Pol. Sci.*, 2(1): 493–535.

O'Sullivan, K. & Barnes, D.F. 2006. Energy policies and multi-topic household surveys: guidelines for questionnaire design in living standards measurement studies. Energy and Mining Sector Board Discussion Paper 17. Washington, DC, World Bank (available at http://documents.worldbank.org/curated/en/2006/04/7088103/energy-policies-multi-topic-household-surveys-guidelines-questionnaire-design-living-standards-measurement-studies). Accessed 30 October 2013.

Paumgarten, F. 2005. The role of non-timber forest products as safety-nets: a review of evidence with a focus on South Africa. *GeoJournal*, 64(3): 189–197.

Persha, L. 2015. Implementation of Tanzania field test and recommendations for strengthening the forestry module and sourcebook for the LSMS-ISA Final report.

Porter-Bolland, L., Ellis, E.A., Guariguata, M.R., Ruiz-Mallén, I., Negrete-Yankelevich, S. & Reyes-García, V. 2012. Community managed forests and forest protected areas: an assessment of their conservation effectiveness across the tropics. *Forest Ecol. Manag.*, 268: 6–17.

Pouliot, M. 2011. Relying on nature's pharmacy in rural Burkina Faso: empirical evidence of the determinants of traditional medicine consumption. *Soc. Sci. Med.*, 73(10): 1498–1507.

Pouliot, M. & Treue, T. 2013. Rural people's reliance on forests and the non-forest environment in West Africa: evidence from Ghana and Burkina Faso. *World Dev.*, 43: 180–193.

PROFOR. 2008. Poverty and forests linkages – a synthesis and six case studies. Washington, DC, World Bank.

PROFOR. 2010. P*overty-forests linkages toolkit* (available at: http://www.profor.info/node/3). Accessed 20 March 2015.

Ribot, J. 1998. Theorizing access: forest products along Senegal's charcoal commodity chain. *Dev. Change*, 29(2): 307–341.

Ribot, J. & Peluso, N.L. 2003. A theory of access. Rural Sociol., 68(2): 153–181.

Riggott, M. 2014. *Micro-data analysis of selected socioeconomic surveys*. FAO Consultancy report.

Rindfuss, R.R., Walsh, S.J., Turner, B.L. 2nd, Fox, J. & Mishra, V. 2004. Developing a science of land change: challenges and methodological issues. *Proc. Natl. Acad. Sci. USA*, 101(39): 13976–13981.

Robinson, W.S. 1950. Ecological correlations and the behavior of individuals. *Am. Sociol. Rev.*, 15(3), 351–357.

Russo, L. 2014. *Review of the coverage of forest-related socio-economic issues in selected surveys*. Consultancy Report. March.

Schlager, E. & Ostrom, E. 1992. Property-rights regimes and natural resources: a conceptual analysis. *Land Econ.*, 68: 249–262.

Shackleton, C.M. & Shackleton, S.E. 2006. Household wealth status and natural resource use in the Kat River Valley, South Africa. *Ecol. Econ.*, 57(2), 306–317.

Shackleton, C.M., Shackleton, S.E., Buiten, E. & Bird, N. 2007. The importance of dry woodlands and forests in rural livelihoods and poverty alleviation in South Africa. *Forest Pol. Econ.*, 9(5): 558–577.

Shepherd, G. 2012. Rethinking forest reliance. Findings about poverty, livelihood resilience and forests from IUCN's "Livelihoods and Landscapes" strategy. Gland, Switzerland, International Union for Conservation of Nature.

Smith-Hall, C. & Larsen, H.O. 2003. Alpine medicinal plant trade and Himalayan mountain livelihood strategies. *Geogr. J.*, 169(3): 243–254.

Suna, Y., Mwangi, E. & Meinzen-Dick, R. 2011. Is gender an important factor influencing user groups' property rights and forestry governance? Empirical analysis from East Africa and Latin America. *Int. Forestry Rev.*, 13(2), 205–219.

Sunderland, T., Angelsen, A., Babigumira, R., Ickowitz, A., Paumgarten, F. & Reyes-Garcia, V. 2014. Challenging Perceptions about men, women, and forest product use: A global comparative study. *World Dev.*, 64(1), S56–S66.

Sunderlin, W.D., Angelsen, A., Belcher, B., Burgers, P., Nasi, R., Santoso, L. & Wunder, S. 2005. Livelihoods, forests, and conservation in developing countries: an overview. *World Dev.*, 33(9): 1383–1402.

Takeuchi, L.R., Hine, S. & Chávez C. 2015. Asking people what they think: Using perceptions

data to monitor the post-2015 agenda. Working Paper 413. London, Overseas Development Institute (ODI).

Tole, L. 2010. Reforms from the ground up: a review of community-based forest management in tropical developing countries. *Environ. Manag.*, 45(6): 1312–1331.

Trench, P.C., Kiruswa, S., Nelson, F. & Homewood, K. 2009. Still "people of cattle"? Livelihoods, diversification and community conservation in Longido District. *In* K. Homewood, P. Kristjanson & P.C. Trench, eds, *Staying Maasai? Livelihoods, conservation and development in East African rangelands*, pp. 217–256. New York, Springer.

Uberhuaga, P., Smith-Hall, C. & Helles, F. 2012. Forest income and dependency in lowland Bolivia. *Environ. Dev. Sustain.*, 14(1): 3–23.

UNFCCC. 2011. *Report of the Conference of the Parties on its sixteenth session, held in Cancun from 29 November to 10 December 2010*. United Nations Framework Convention on Climate Change (available at http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf#page=2). Accessed 20 January 2015.

Vedeld, P. 2004. *Counting on the environment: forest incomes and the rural poor.* No. 98. Washington, DC, World Bank, Environment Department.

Vedeld, P., Angelsen, A., Bojö, J., Sjaastad, E. & Berg, G. K. 2007. Forest environmental incomes and the rural poor. *Forest Pol. Econ.*, 9(7): 869–879.

Verchot, L.V., Van Noordwijk, M., Kandji, S., Tomich, T., Ong, C., Albrecht, A., Mackensen, J., Bantilan, C., Anupama K.V. & Palm, C. 2007. Climate change: linking adaptation and mitigation through agroforestry. *Mitig. Adapt. Strateg. Global Change*, 12: 901–918.

Wertime, M., Ostrom, E., Gibson, C., Lehoucq, F., Agarwal, C., Becker, D., England, J., Fischer, B., Huckfeldt, S., Humphrey, R., Jerrells, J., Koontz, T., Longmire, S., Mangrich, M., Patterson, N., Schweik, C., Tucker, C., Turner, P. & Varughese, G. 2008. *Field manual.* IFRI Research Program. School of Natural Resource University of Michigan, Ann Arbor (available at http://www.ifriresearch.net/wp-content/uploads/2012/09/IFRI_Manual.pdf). Accessed 17 January 2015.

White, A. & Martin, A. 2002. *Who owns the world's forests? Forest tenure and public forests in transition*. Washington, DC, Forest Trend.

Whittington, D. 2000. Chapter 14: Environmental issues. *In* M. Grosh & P. Glewwe, eds. *Designing household survey questionnaires for developing countries. Lessons from 15 years of the Living Standards Measurement Study.* Vol. II. Washington, DC, World Bank.

Wickramasinghe, A., Ruiz Perez, M. & Blockhus, J.M. 1996. Non-timber forest product gathering in Ritigala Forest (Sri Lanka): household strategies and community differentiation. *Hum. Ecol.*, 24(4): 27.

Wiersum, K.F. 1997. Indigenous exploitation and management of tropical forest resources: an evolutionary continuum in forest-people interactions". *Agriculture, Ecosystems and Environment*, 63: 1–16

World Bank. 2011. Living standards measurement study – integrated surveys on agriculture: methodology (available at http://go.worldbank.org/OQQUQY3P70). Accessed 2 November 2013.

World Bank. 2015a. *National Panel Survey 2010-2011. Agricultural questionnaire Tanzania* (available at http://siteresources.worldbank.org/INTLSMS/Resources/3358986-1233

781970982/5800988-1286190918867/NPS_Agriculture_Qx_English_(Year2)_v2.pdf). Accessed October 2013.

World Bank. 2015b. *National Panel Survey 2010-2011. Fisheries questionnaire Tanzania* (available at http://siteresources.worldbank.org/INTSURAGRI/Resources/7420178-1294154345427/NPS_Fishery_Qx_English_Year_2.pdf). Accessed October 2013

Wright, S.J., Sanchez-Azofeifa, G.A., Portillo-Quintero, C. & Davies, D. 2007. Poverty and corruption compromise tropical forest reserves. *Ecol. Appl.*, 17(5): 1259–1266.

Wunder, S. 2005. Payments for environmental services: some nuts and bolts. CIFOR Occasional Paper 42, 24 pp.

Wunder, S. 2015. Revisiting the concept of payments for environmental services. *Ecological Economics*. 117: 234–243.

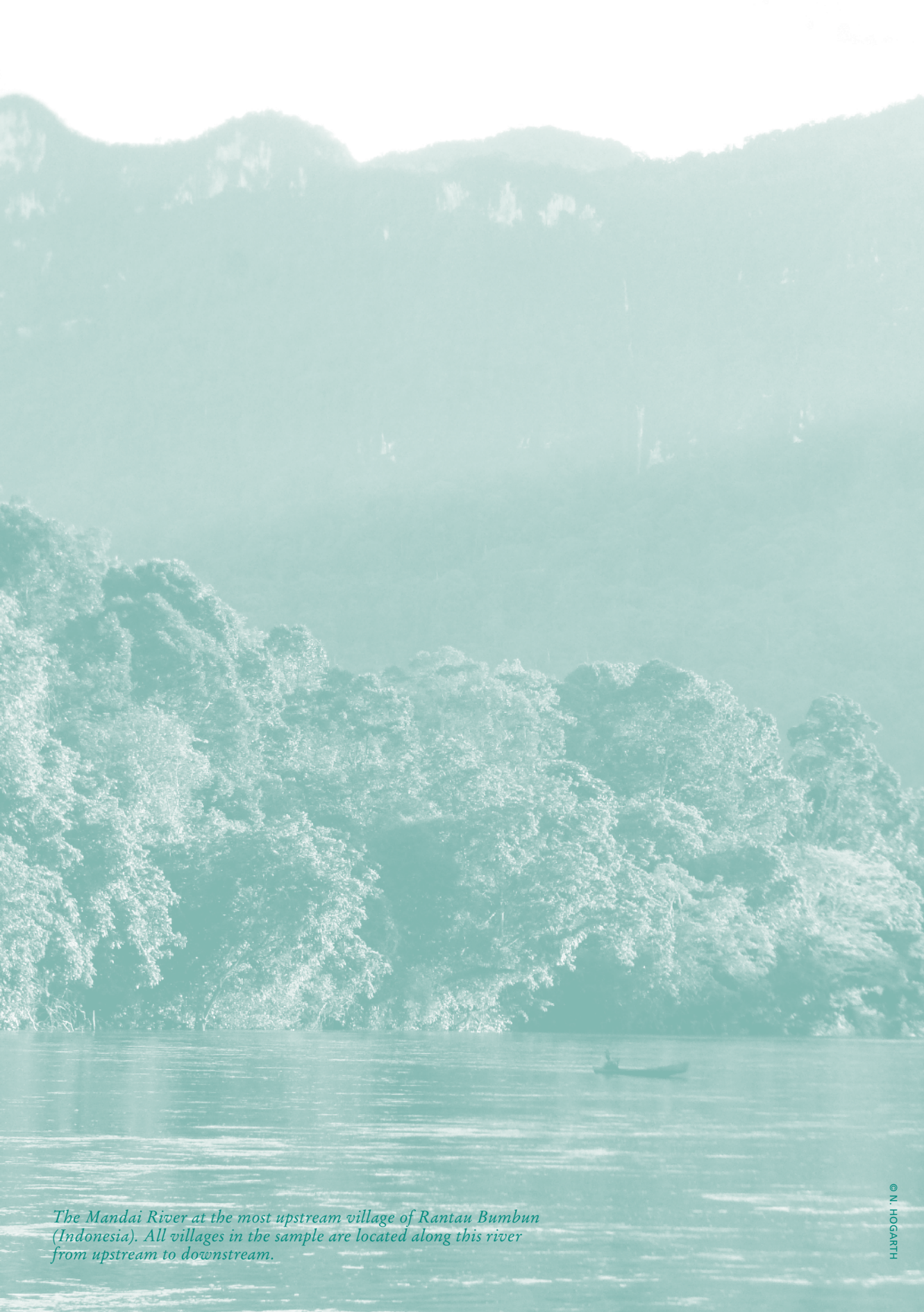
Wunder, S., Luckert, M. & Smith-Hall, C. 2011. Chapter 8: Valuing the priceless: what are non-marketed products worth? *In* A. Angelsen, H.O. Larsen, J.F. Lund, C. Smith-Hall & S. Wunder, eds. *Measuring livelihoods and environmental dependence. Methods for research and fieldwork*, pp. 163–174. London, Earthscan.

Wunder, S., Angelsen, A. & Belcher, B. 2014a. Forests, livelihoods, and conservation: broadening the empirical base. *World Development*, Vol. 64 (Special Supplement: "Forests, Livelihoods, and Conservation"), pp. S1–11.

Wunder, S., Börner, J., Shively, G. & Wyman, M. 2014b. Safety nets, gap filling and forests: a global-comparative perspective. *World Dev.*, Vol. 64 (Special Supplement: Forests, Livelihoods, and Conservation), pp. S29–S42.

Zulu, L.C. 2010. The forbidden fuel: charcoal, urban woodfuel demand and supply dynamics, community forest management and woodfuel policy in Malawi. *Energ. Pol.*, 38(7): 3717–3730.

Annexes



The Mandai River at the most upstream village of Rantau Bumbun (Indonesia). All villages in the sample are located along this river from upstream to downstream.

© N. HOGARTH

Annex A
Definitions

Term/concept	Definition	Origin
Adaptation (to climate change)	Adjustment in natural or human systems in response to actual or expected climate stimuli or their effects, which moderates harm or exploits beneficial opportunities.	IPCC (2001)
Agroforestry	A collective name for land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence.	Adapted from Nair (1993); Lundgren and Raintree (1982)
Barter	A form of trade where a commodity (e.g. agricultural produce) or service (e.g. labour) is exchanged for another commodity or service, without any monetary transactions involved.	CIFOR (2007)
Biodiversity	The variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part; this includes diversity within species, among species, and of ecosystems.	IUCN (2010)
Carbon sequestration	The removal and storage of carbon from the atmosphere in carbon sinks (such as oceans, forests or soils) through physical or biological processes, such as photosynthesis.	GreenFacts
Cash products	Products intended for sale to generate cash income for the household.	Developed for this sourcebook
Climate change	The state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use.	IPCC (2013)
Communal land tenure	A right of commons may exist within a community where each member has a right to use independently the holdings of the community. For example, members of a community may have the right to graze cattle on a common pasture.	FAO (2002, p. 8)
Coping strategy	Ex-post response strategies employed by households in the wake of shocks in order to smooth consumption.	Dercon (2002)
Cropland	Includes arable land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow. Land abandoned as a result of shifting cultivation is excluded. Also includes land under permanent crops, which is land cultivated with crops that occupy the land for long periods and need not be replanted after each harvest, such as cocoa, coffee and rubber.	FAO (2014c)
Cultivated land	Any land planted and/or managed by humans – for crops, livestock or forests.	CIFOR (2007)

Table continues on next page

Table continued

Term/concept	Definition	Origin
De facto rights	Informal rights that have been defined and enforced among a resource user group.	Schlager and Ostrom (1992)
De jure rights	Formal rights that have legal recognition by means of formal legal instruments and are therefore more secure.	Schlager and Ostrom (1992)
Ecotourism	Responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education.	International Ecotourism Society
Environmental non-forest products	Any product from non-cultivated natural ("wild") systems.	Developed for this sourcebook
Fallow	Idle cropland which is part of an agricultural (cropping or pastoral) rotation system, but which is temporarily not being cultivated. To qualify as fallow the age should be below 15 years.	Adapted from CIFOR (2007)
Forest	Lands of more than 0.5 ha, with a tree canopy cover of more than 10 percent, where the trees should be able to reach a minimum height of 5 m in situ, and which are not primarily under agricultural or urban land use.	FAO (2006, p. 169)
Forest products	Goods collected or harvested from forests as defined above and encompassing old-growth natural forest, secondary and regenerating natural forest, plantation forest and timber and a wide range of NTFPs, including tree-based (e.g. some fruits), various plants (e.g. tubers), and fauna (e.g. bush pig). Also tree-based products from non-forest systems including trees on farms, woodlots and agroforestry	Developed for this sourcebook
Formal rules/ institutions	Formal institutions include the written constitution, laws, policies, rights and regulations enforced by third parties.	North (1990); Leftwich and Sen (2010)
Gift	The transfer of a commodity or service without any direct (present or future) compensation.	CIFOR (2007)
Grassland	Land which has naturally occurring grass as the predominant vegetation. If it has trees scattered around (and canopy cover below 10 percent), it may be referred to as savannah or wooded grassland.	Adapted from CIFOR (2007)
Household	A group of people (normally family members) living under the same roof, and pooling resources (labour and income). Labour pooling means that household members exchange labour time without any payment, e.g. on the farm. Income pooling means that they "eat from the same pot", although some income may be kept by the household member who earns it.	CIFOR (2007)
Income	The return for labour and capital owned, used in production and other value added activities (self-employment or business), for own use or sold in a market (e.g. wage labour). Transfers are also included in the income definition, e.g. in the form of remittances or pensions, as well as resource rents, e.g. from oil, minerals or payments for environmental services.	Developed for this sourcebook from CIFOR (2007)
Informal rules/ institutions	The usually unwritten social norms, customs or traditions that shape thought and behaviour.	North (1990), Leftwich and Sen (2010)
Institution	The set of rules actually used by individuals or a set of individuals and potentially affecting others.	Ostrom (1999, p. 51)

Table continues on next page

Table continued

Term/concept	Definition	Origin
Managed forest	Forest that consists predominantly of indigenous vegetation, and with active management to increase the frequency and productivity of beneficial species. The management will include felling (trimming, thinning in addition to regular harvesting) and planting of indigenous and/or exotic species. Can include forests managed for timber production, and forests managed for various NTFPs.	CIFOR (2007)
Natural forest (or old-growth natural forest)	Forest that consists of indigenous (native) tree species. It is managed only to a very limited degree, i.e. practising "tolerant forest management in which the native vegetation is largely conserved or reconstructed through successional processes".	CIFOR (2007) and Wiersum (1997)
Non-forest natural system	Areas that do not classify as forest or agriculture, with natural vegetation, e.g. grassland, scrublands and rangelands.	Developed for this sourcebook
Non-forest tree-based cultivated systems	Areas that do not classify as forest or agriculture but are characterized by planted/cultivated perennial woody vegetation, e.g. woodlots, trees on farms, agroforestry.	Developed for this sourcebook
Non-forest tree-based wildland systems	Areas that do not classify as forest or agriculture, but are characterized by considerable amounts of perennial woody vegetation, e.g. savannahs, *miombo* woodlands, fallows.	Developed for this sourcebook
Open access	Specific rights are not assigned to anyone and no one can be excluded. This typically includes marine tenure where access to the high seas is generally open to anyone; it may include rangelands, forests, etc., where there may be free access to the resources for all. (An important difference between open access and communal systems is that under a communal system non-members of the community are excluded from using the common areas.)	FAO (2002, p. 8)
Open forest	Have a canopy cover between 10 and 40 percent. Open forests generally have a continuous grass layer. Examples include the wooded savannahs and woodlands in Africa, and part of the *cerrado* and *chaco* in Latin America.	CIFOR (2007)
Pasture	Where grasses and/or legumes have been established by humans and/or involve some other form of active management.	CIFOR (2007)
Payment for environmental services (PES)	A voluntary transaction for a well-defined ecological service, with at least one buyer, at least one provider, and based on the condition that the buyer(s) only pays if the provider(s) continues to deliver the defined environmental service over time.	Wunder (2005)
Plantation forest	Forest stands established by planting and/or seeding in the process of afforestation or reforestation. They are either of introduced species (all planted stands), or intensively managed stands of indigenous species which meet all the following criteria: one or maximum two species when established, even age class, regular spacing.	Adapted from FAO (2000)
Private land tenure	The assignment of rights to a private party who may be an individual, a married couple, a group of people, or a corporate body such as a commercial entity or non-profit organization. For example, within a community, individual families may have exclusive rights to residential parcels, agricultural parcels and certain trees. Other members of the community can be excluded from using these resources without the consent of those who hold the rights.	FAO (2002, p. 8)
REDD+	Reducing Emissions from Deforestation and Forest Degradation, conservation, sustainable management of forests, and enhancement of forest carbon stocks, in developing countries.	UNFCCC (2011)

Table continues on next page

Table continued

Term/concept	Definition	Origin
Secondary forest or secondary/ regenerating natural forest	Forests regenerating largely through natural processes after significant human and/or natural disturbance of the original forest vegetation at a single point in time or over an extended period, and displaying a major difference in forest structure and/or canopy species composition with respect to nearby primary forests on similar sites.	Chokkalingam and de Jong (2001)
State land tenure	Property rights are assigned to some authority in the public sector. For example, in some countries, forest lands may fall under the mandate of the state, whether at a central or decentralized level of government.	FAO (2002, p. 8)
Subsistence products	Products intended to meet the basic consumption needs of the household	Developed for this sourcebook
Village	The lowest administrative unit in an area.	CIFOR (2007)
Watershed protection	Protection of an area of land that contains a common set of streams and rivers that all drain into a single larger body of water, such as a larger river, a lake or an ocean.	Adapted from Missouri Botanical Garden (2002)

Young girl preparing fodder (from wild products) to feed her family's pigs (Indonesia).

© I.W. BONG

Annex B
Forestry modules

Editable version of forestry modules can be downloaded from http://www.fao.org/forestry/forestry-modules.

Standard community questionnaire
COM_Module A: Seasonal calendar
COM_Module B: Most important forest and wild products
COM_Module C: Units and pricing
COM_Module D: Community benefits
    COM_Module D1: Practices
    COM_Module D2: Support

Extended community questionnaire
COM_Module E: Governance
    COM_Module E1. Forest institutions
    COM_Module E2. Enforcement and penalties
COM_Module F: Community environmental services
    COM_Module F1: Perceptions of climate change

Standard household questionnaire
HH_Module A: Income
    HH_Module A1. Income from forest and wild products
    HH_Module A2. Other forest-related income sources, including PES programmes
HH_Module B: Forest resources – energy, health and construction
    HH_Module B1. Forest resource base
    HH_Module B2. Forests and energy – fuelwood and charcoal
    HH_Module B3. Forests and health
    HH_Module B4. Forests and construction
HH_Module C: Food shortage and crises
    HH_Module C1. Food shortage
    HH_Module C2. Shocks and crises

Extended household questionnaire
HH_Module D: Forest changes and clearance
    HH_Module D1. Forest changes
    HH_Module D2. Forest clearance

Standard community questionnaire

Facilitators: prior to starting the community questionnaire, engage the members of the focus group in a general discussion with the objective of discussing forest issues in this community. This should be a conversation rather than a set of rigid questions and answers. Questions to help start the conversation should include the following (the order in which they are asked is less important).

Can you give us a brief history of the forests in your village, or those that are used by people who live here? What type of forests are they? What is the area of each of these forests? What is the name used by villagers in this community to refer to each of these forest areas?

How are these different forests being managed, and what is the management type? When did these different types of management begin for each of these forests?

In what ways do people in this village use these forests? Can you tell us about the different rules and laws in place here for using these forests?

Enumerators: record the basic information on each of the forests present or used by this community below, and refer to as needed throughout the focus group discussion.

Forest name used by community	Management type	Year established (if relevant)	Forest size (hectares)

COM_MODULE A: Seasonal calendar

Note: to be filled out in a community focus group discussion.

COM_MODULE A: SEASONAL CALENDAR														
In this community, during which months/seasons are the most important forest and wild products collected? Please create a list of all products mentioned by community members in the focus group discussion. CODES: *1 = main harvest 2 = sale 3 = harvest and sale period are the same* **Note: this list of products should be included in standard HH_module A (income) to ensure every product is asked about, and no major seasonal products risk being overlooked.**														
SEASON NAME (use local name) ➡														
No.	PRODUCT	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Notes

COM_MODULE B: Most important forest and wild products

Note: to be filled out in a community focus group discussion. Refer to the enumerator manual for definitions.

COM_MODULE B. MOST IMPORTANT FOREST AND WILD PRODUCTS						
PLEASE ENTER ONLY ONE PRODUCT CODE PER BOX (SEE CODEBOOK FOR PRODUCT CODES)						
	CASH			SUBSISTENCE		
	1st most important product [MIP]	2nd most important product [MIP]	3rd most important product [MIP]	1st most important product [MIP]	2nd most important product [MIP]	3rd most important product [MIP]
1. What are the three most important forest and wild products [MIPs], if any, for the livelihoods of the people in the village for cash and/or subsistence? (CODE PRODUCT) IF THE SAME PRODUCT IS LISTED FOR BOTH CASH AND SUBSISTENCE, FILL OUT BOTH COLUMNS, AS RESPONSES TO FOLLOWING QUESTIONS MAY DIFFER BETWEEN COLLECTION FOR CASH AND SUBSISTENCE.						
2. From where is this product predominantly collected (origin)? (choose one) CODE ORIGIN *1 = old-growth natural forest* *2 = secondary/regenerating forest* *3 = managed plantation forest* *4 = non-forest tree-based wild system* *5 = non-forest tree-based cultivated system* *6 = non-forest with natural vegetation* *99 = other, specify:*						
3. What is the legal ownership status of the land where this product is predominantly collected? (choose one) CODE TENURE *1 = community* *2 = private* *3 = state-owned* *99 = other, specify:*						
4. How easily can people from this community access this land in practice, without concern for penalties? *1 = very easy* *2 = somewhat easy* *3 = neither difficult nor easy* *4 = somewhat difficult* *5 = very difficult*						

COM_MODULE B continues on next page

COM_MODULE B continued

COM_MODULE B. MOST IMPORTANT FOREST AND WILD PRODUCTS							
5. Who is primarily collecting these products? (choose one) *1 = subsistence-oriented users in the village* *2 = small-scale commercial users in the village* *3 = large-scale commercial users in the village* *4 = subsistence-oriented users from outside the village* *5 = small-scale commercial users from outside the village* *6 = large-scale commercial users from outside the village* *99 = other, specify:*							
6. Who is primarily buying these products? (choose one) *1 = subsistence-oriented users in the village* *2 = small-scale commercial users in the village* *3 = large-scale commercial users in the village* *4 = subsistence-oriented users from outside the village* *5 = small-scale commercial users from outside the village* *6 = large-scale commercial users from outside the village* *99 = other, specify:*							
7. How has availability of MIPs changed over the past five years (in the area from where it is predominantly collected)? *0 = no change* >> [NEXT MODULE] *1 = increased* >> [9] *2 = decreased* >> [8]							
8. If the availability of MIPs has declined, what are the main reasons?	REASON	Rank (1 to 3)	Rank (1 to 3)	Rank (1 to 3)	Rank (1 to 3)	Rank (1 to 3)	Rank (1 to 3)
Please rank the three most important reasons IF THE PRODUCTS ARE THE SAME FOR CASH AND SUBSISTENCE, BUT THE REASONS ARE DIFFERENT, THEN FILL IN EACH COLUMN SEPARATELY. IF THE REASONS ARE THE SAME, THEN THERE IS NO NEED TO FILL IN EACH COLUMN.	*1 = increased collection of MIPs for sale*						
	2 = reduced forest area due to small-scale clearing						
	3 = reduced forest area due to large-scale clearing						
	4 = increased demand for MIPs from local people for own use						

COM_MODULE B continues on next page

COM_MODULE B continued

COM_MODULE B. MOST IMPORTANT FOREST AND WILD PRODUCTS							
	5 = increased demand for MIPs due to more collection from outsiders for own use						
	6 = reduced forest access by central or state government (e.g. for forest conservation)						
	7 = reduced forest access due to people from outside buying land						
	8 = restrictions on MIP/ forest use by government rules						
	9 = local restrictions on MIP/forest use (e.g. use by internal or community rules)						
	10 = climate change (e.g. drought and less rainfall)						
	11 = plants difficult to grow or cultivate						
	99 = other, specify:						
9. If the availability of MIPs has increased, what are the reasons?	REASON	Rank (1 to 3)	Rank (1 to 3)	Rank (1 to 3)	Rank (1 to 3)	Rank (1 to 3)	Rank (1 to 3)
Please rank the three most important reasons IF THE PRODUCTS ARE THE SAME FOR CASH AND SUBSISTENCE, BUT THE REASONS ARE DIFFERENT, THEN FILL IN EACH COLUMN SEPARATELY. IF THE REASONS ARE THE SAME, THEN THERE IS NO NEED TO FILL IN EACH COLUMN.	*1 = more availability of MIPs due to better forest management*						
	2 = less demand for MIPs for sale						

COM_MODULE B continues on next page

COM_MODULE B continued

COM_MODULE B. MOST IMPORTANT FOREST AND WILD PRODUCTS							
	3 = fewer local (village) people collecting for own use						
	4 = fewer outsiders (subsistence users) collecting for own use						
	5 = fewer outsiders (commercial users) collecting/ using						
	6 = improved access rights to product						
	7 = exploitation of new forest areas						
	8 = forest clearing that increases supply of product (e.g. fuelwood)						
	9 = climate change, (e.g. changes in rainfall)						
	10 = plants easy to grow or cultivate						
	99 = other, specify:						

If extended module is going to be implemented, proceed to this now.

COM_MODULE C: Units and pricing

Note: can be answered by village head/key informant but can also be part of the focus group discussion.

COM_MODULE C1. UNITS AND PRICING				
DO UNIT CONVERSION AND PRICING FOR ALL PRODUCTS IDENTIFIED IN THE SEASONAL CALENDAR (MODULE A). THIS MODULE IS TO RECORD THE METRIC EQUIVALENTS OF MAIN LOCAL UNITS USED IN THE STANDARD HH_MODULE A: INCOME AND OTHER MODULES. ADD ROWS AS NEEDED. IF A PRODUCT IS AVAILABLE IN MORE THAN ONE LOCAL UNIT, ENTER EACH PRODUCT–UNIT COMBINATION ON A SEPARATE LINE.				
No.	PRODUCT	LOCAL UNIT NAME	EQUIVALENT ENGLISH TERM	STANDARD UNIT EQUIVALENT (THESE MEASUREMENTS SHOULD BE WEIGHT in kilograms, tonnes, ounces; VOLUME in litres, cubic metres, …; OR LENGTH in metres, feet, …}
1				
2				
3				
4				
5				

COM_MODULE D: Community benefits from forest-related land use or management programmes

Note: can be answered by village head/key informant but can also be part of the focus group discussion.

COM_MODULE D1. PRACTICE							
		1. Over the past five years, has your community participated in any programme related to [PRACTICE]? *1 = yes* *2 = no* >> [NEXT PRACTICE]	2. What were the main programmes/ objectives which required the implementation of these practices? CODES: *1 = ecotourism/ landscape beauty* *2 = carbon sequestration/ REDD+* *3 = watershed protection* *4 = biodiversity conservation* *5 = payment for use of forest (e.g. from timber or mining companies)* *99 = other, specify:* ASK THE FOCUS GROUP TO DESCRIBE EACH OF THE PROGRAMMES THEY WERE INVOLVED IN, TO HELP CONFIRM THE CORRECT PROGRAMME TYPE.	3. Was this [PRACTICE] still continuing at any time over the past 12 months? *1 = yes* *2 = no*	4. During the time that the programme related to [PRACTICE] was active, did any individuals in the village, or the community as whole, receive any cash or other benefits from this [PRACTICE]? CODES: *0 = no* *1 = yes, cash payments to households* *2 = yes, other benefits to households (specify:)* *3 = yes, cash payment to the village as whole* *4 = yes, other benefits to the village as a whole (for example, a community development project, school classroom, health clinic, or other service)* *5 = yes, both to household and village*	5. For how many months did the programme related to [PRACTICE] continue? NUMBER OF MONTHS:	6. Who was implementing this programme related to [PRACTICE]? CODES: *1 = government/ public office* *2 = international funding agency* *3 = NGO* *99 = other group, specify:*
1	Sustainable use of forest (e.g. sustainable logging)						
2	Conservation of parts of forests for biodiversity (e.g. wildlife habitats)						
3	Conservation of parts of forests for watershed protection						

COM_MODULE D1 continues on next page

COM_MODULE D1 continued

COM_MODULE D1. PRACTICE							
4	Forest fires and pest control practices						
5	Grazing management						
6	Permitting access to forest						
99	Other, specify:						

COM_MODULE D2. SUPPORT				
		7. Over the past five years, has the village received any forest-related external [SUPPORT]? CODES: *1 = yes* *2 = no*	8. Was this support still continuing at any time over the past 12 months? CODES: *1 = yes* *2 = no*	9. Who provided the forest-related external support? CODES: *1 = government/public office* *2 = international funding agency* *3 = NGO* *99 = other group, specify:*
1	Technical assistance for forestry practice (e.g. community-based forest management)			
2	Training in forest management			
3	Information on forest policies and laws			
4	Training in forest product processing			
5	Free seedlings			
6	Free implements for forestry operations			
7	Free growth/protection inputs (e.g. fertilizers)			
99	Other, specify:			

Extended community questionnaire

COM_MODULE E: Governance

Note: to be done in focus group discussion, as continuation of modules A and B.

COM_MODULE E1. FOREST INSTITUTIONS	CASH			SUBSISTENCE		
	1st [MIP]	2nd [MIP]	3rd [MIP]	1st [MIP]	2nd [MIP]	3rd [MIP]
NOTE: TAKE MIP (NAME) FROM STANDARD COM_MODULE B: MOST IMPORTANT FOREST AND WILD PRODUCTS. *1. What are the three most important forest products (MIPs), if any, for the livelihood of the people in the village for cash and subsistence?* (CODE PRODUCT)						
1.1 Are there any rules (either formal or informal) regulating the harvesting and use of MIPs in the village? CODES: *0 = none/very few* >> [1.6] *1 = yes, but vague/unclear* *2 = yes, clear rules exist* *3 = don't know*						
1.2 If yes (code 1 or 2 above): who predominantly makes the rules regarding harvesting and use of MIPs? CODES: *1 = village head* *2 = community forest associations/customary institutions* *3 = forest officer (government forest departments)* *4 = other government department/regulations (Name:)* *5 = private landowners* *6 = private company (Name:)* *99 = other, specify:*						
1.3 What is the main type of activity that is influenced by these rules? CODES: *1 = time of extraction/harvest of MIPs from forest* *2 = amount of MIPs harvested* *3 = who is eligible to harvest MIPs* *4 = where in the forest MIPs can be harvested* *99 = other, specify:*						
1.4 Are these rules regarding forest use respected by the population of the village? CODES: *0 = no/very little* *1 = to a certain extent by some groups of villagers* *2 = to a certain extent by everyone* *3 = yes, but only by some groups of villagers* *4 = yes, by everyone*						

COM_MODULE E1 continues on next page

COM_MODULE E1 continued

COM_MODULE E1. FOREST INSTITUTIONS						
1.5 What type of rules regulate the use of MIPs in the village? CODES: *1 = rules are established by law or formal regulations (de jure)* *2 = informal rules-in-use that are typically followed by the community, even if not established by law or formal regulations (de facto)* *3 = both* *99 = other, specify:*						
1.6 Do the users require any permission to harvest MIPs, under these rules? CODES: *0 = no* >> [NEXT MODULE] *1 = yes, users have to inform the authorities* *2 = yes, written permission needed*						
1.7 If yes (code 1 or 2 above): does the user have to pay for permission? CODES: *1 = yes* *2 = no* >> [NEXT MODULE]						
1.8 If yes, who issues this permit? CODES: *1 = village head* *2 = community forest associations/customary institutions* *3 = forest officer (forest departments)* *4 = other government official* *99 = other, specify:*						
1.9 Does the area where collection of MIPs takes place have a sustainable management plan? *1 = yes* *2 = no* >> [E.2]						
1.10 Is the permit for use of MIPs issued by the correct authority? *1 = yes* *2 = no*						

COM_MODULE E2. ENFORCEMENT AND PENALTIES						
	CASH			SUBSISTENCE		
	1st [MIP]	2nd [MIP]	3rd [MIP]	1st [MIP]	2nd [MIP]	3rd [MIP]
2.1 Who enforces the formal rules of forest MIP use? CODES: *1 = village head;* *2 = community forest associations/customary institutions* *3 = forest officer (government forest departments)* *4 = other government department/regulations (Name:)* *5 = private landowners* *6 = private company (Name:)* *99 = other, specify:*						

COM_MODULE E2 continues on next page

COM_MODULE E2 continued

COM_MODULE E2. ENFORCEMENT AND PENALTIES						
2.2 Are there any penalties on those violating the formal rules of forest MIP use in general? *1 = yes* *2 = no* >> [2.4]						
2.3 What is the main type of penalty? *1 = fee (cash payment)* *2 = returning collected products* *3 = labour (extra work)* *4 = warning* *5 = temporary exclusion from resource use* *6 = permanent exclusion from resource use* *99 = other, specify:*						
2.4 Who enforces the informal rules of forest MIP use? *1 = village head* *2 = community forest associations/customary institutions* *3 = forest officer (forest departments)* *4 = other government department/regulations* *5 = private landowners, companies* *99 = other, specify:*						
2.5 Are there any penalties on those violating the informal rules of forest MIP use? *1 = yes* *2 = no* >> [END]						
2.6 What is the main type of penalty? *1 = fee (cash payment)* *2 = returning collected products* *3 = labour (extra work)* *4 = take away user rights* *5 = warning* *6 = exclusion from resource use* *99 = other, specify:*						
2.7 How many penalties (in total) were issued to violators in the past 12 months?						

COM_MODULE F: Community environmental services

Note: to be done with focus group.

COM_MODULE F1. PERCEPTIONS OF CLIMATE CHANGE	
1. We hear much in the news about how climate change is affecting people in rural communities. Please can you tell us the main signs of climate change that you have observed in your village, if any? WRITE BRIEF DESCRIPTION OF CLIMATE CHANGES OBSERVED IN THIS VILLAGE:	LSMS-TYPE SURVEYS ARE UNSUITABLE FOR OPEN-ENDED QUESTIONS. USERS ARE ENCOURAGED TO DEVELOP A CODED SET OF ANSWERS/OPTIONS TO REFLECT THE SPECIFICITY OF THE SETTING WHERE THE SURVEY IS BEING IMPLEMENTED.
2. Please can you describe the specific ways, if any, that climate change is affecting people in your village? WRITE BRIEF DESCRIPTION OF NEGATIVE EFFECTS:	LSMS-TYPE SURVEYS ARE UNSUITABLE FOR OPEN-ENDED QUESTIONS. USERS ARE ENCOURAGED TO DEVELOP A CODED SET OF ANSWERS/OPTIONS TO REFLECT THE SPECIFICITY OF THE SETTING WHERE THE SURVEY IS BEING IMPLEMENTED.
3. Are people in your village taking any steps to combat or protect against these changes? CODES: *1 = yes 2 = no*	
4. If yes, can you describe up to three main activities that people in your village are engaging in to protect against negative effects of climate change? WRITE BRIEF DESCRIPTION OF MAIN ACTIVITIES: LSMS-TYPE SURVEYS ARE UNSUITABLE FOR OPEN-ENDED QUESTIONS. USERS ARE ENCOURAGED TO DEVELOP A CODED SET OF ANSWERS/OPTIONS TO REFLECT THE SPECIFICITY OF THE SETTING WHERE THE SURVEY IS BEING IMPLEMENTED.	1. 2. 3.
5. Up until now, how helpful have each of these activities been in helping your community to overcome the negative effects of climate change? *1 = very helpful; 2 = somewhat helpful; 3 = no difference at all; 4 = somewhat unhelpful (works somewhat against our objectives); 5 = very unhelpful (has an opposite or negative effect from what we intended)*	CODE for Activity #1: CODE for Activity #2: CODE for Activity #3:
6. In the future, beyond five years from now, do you think these activities will help your community to better overcome the negative effects of climate change? *1 = very helpful; 2 = somewhat helpful; 3 = no difference at all; 4 = somewhat unhelpful (works somewhat against our objectives); 5 = very unhelpful (has an opposite or negative effect from what we intended)*	CODE for Activity #1: CODE for Activity #2: CODE for Activity #3:

Standard household questionnaire

HH_MODULE A: Income

HH_MODULE A1. INCOME FROM FOREST AND ENVIRONMENTAL PRODUCTS

1.1 During the past 12 months have you or any member of your household **collected** any forest products (such as wild fruits, nuts and honey, wood, mushrooms, medicinal plants, etc.) or environmental ("wild") products (e.g. from grasslands, fallows, etc.), for either your own use or sale?	*1 = yes* *2 = no* >> [NEXT MODULE]

ADD ROWS AS NEEDED, ACCORDING TO THE CONTEXT. USERS OF THE SOURCEBOOK ARE ADVISED TO USE PREPRINTED LIST OF ITEMS AS MUCH AS POSSIBLE, INSTRUCTING ENUMERATORS TO PROMPT FOR EACH ITEM. FAILURE TO DO SO WILL RESULT IN MISSING OUT ON MANY ITEMS, PARTICULARLY THE LESS FREQUENT ONES, AND THEREFORE UNDERESTIMATING INCOME. ADD PRODUCTS UNDER RELEVANT SUBCATEGORY, REFER TO CODEBOOK FOR CODES.

REFER TO SEASONAL CALENDAR TO ENSURE ALL PRODUCTS ARE ASKED FOR. FOR EACH PRODUCT ASK HOW MUCH [IN QUANTITY] ON AVERAGE WAS COLLECTED PER WEEK DURING THE SEASON, AND MULTIPLY BY NUMBER OF WEEKS OF COLLECTION (AFTER THE SURVEY) TO GET THE YEARLY FIGURE
PRICE PER UNIT SHOULD BE CURRENT/MOST RECENT.

	Product	1.2 Who primarily collected the product? LIST USING INDIVIDUAL ID NUMBER FROM HOUSEHOLD ROSTER	1.3 How many household members were collecting this product at any point in time during the last 12 months?	1.4 From where is the product collected? *1 = old-growth natural forest* *2 = secondary/ regenerating forest* *3 = managed plantation forest* *4 = non-forest tree-based wild* *5 = non-forest tree-based cultivated* *6 = non-forest with natural vegetation*	1.5 Labour (a) In the last 12 months, how many weeks did [HH] spend collecting [PRODUCT]? (b) In those weeks, how many days per week were used to collect [PRODUCT]? (c) On those days, how many hours per day were spent collecting [PRODUCT]?			1.6 What is the total quantity collected?	1.7 What is the unit of collection?	1.8a Did you or household use or consume any amount of the [PRODUCT] collected (incl. gifts, and quantity lost/ spoilt)? (yes/no)? If no >> [1.9a]
No.	Code product	Household member	No.	Code origin	1.5.A no. of weeks	1.5.B days/ week	1.5.C hours/ day	Total quantity	Unit	Quantity used
A	Non wood-based									
Fruits										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

	1.8b If yes, what is the quantity?	1.9a Did you or household sell the product (including barter) (yes/no)? If no >> [1.10]	1.9b If yes, what is the quantity?	1.10 What is the current/ most recent price per unit?	1.11 What is the gross value of sales and subsistence? (1.6*1.10) TO BE CALCULATED LATER	1.12a Did you bear any transport/ marketing costs? (yes/no)?	1.12b If yes how much? (TOTAL)	1.13a Did you bear any cost of purchased and own inputs plus hired labour or any costs of renting land/ collection fees? (yes/no)?	1.13b If yes how much? (TOTAL)	1.14 What is the net revenue? (1.11–1.12b–1.13b) TO BE CALCULATED LATER	Notes/ comments
	Quantity used	Sold	Quantity sold	Price per unit		Transport/ market	Costs transport/ market	Inputs	Costs inputs		

HH_MODULE A1 continues on next page

HH_MODULE A1 continued

HH_MODULE A1. INCOME FROM FOREST AND ENVIRONMENTAL PRODUCTS

	Product	1.2 Who primarily collected the product? LIST USING INDIVIDUAL ID NUMBER FROM HOUSEHOLD ROSTER	1.3 How many household members were collecting this product at any point in time during the last 12 months?	1.4 From where is the product collected? *1 = old-growth natural forest* *2 = secondary/ regenerating forest* *3 = managed plantation forest* *4 = non-forest tree-based wild* *5 = non-forest tree-based cultivated* *6 = non-forest with natural vegetation*	1.5 Labour (a) In the last 12 months, how many weeks did [HH] spend collecting [PRODUCT]? (b) In those weeks, how many days per week were used to collect [PRODUCT]? (c) On those days, how many hours per day were spent collecting [PRODUCT]?			1.6 What is the total quantity collected?	1.7 What is the unit of collection?	1.8a Did you or household use or consume any amount of the [PRODUCT] collected (incl. gifts, and quantity lost/spoilt)? (yes/no)? If no >> [1.9a]	
No.	Code product	Household member	No.	Code origin	1.5a no. of weeks	1.5b days/ week	1.5c hours/ day	Total quantity	Unit	Quantity used	
Vegetables											
11											
12											
13											
14											
Mushrooms/nuts											
15											
16											
Honey											
17											
Seeds											
18											
Other											
19											
20											
21											
B	Animals										
22											
23											
C	Medicinal plants										
D	Wood-based										
	Fuelwood										
	Timber										

	1.8b If yes, what is the quantity?	1.9a Did you or household sell the product (including barter) (yes/no)? If no >> [1.10]	1.9b If yes, what is the quantity?	1.10 What is the current/ most recent price per unit?	1.11 What is the gross value of sales and subsistence? (1.6*1.10) TO BE CALCULATED LATER	1.12a Did you bear any transport/ marketing costs? (yes/no)?	1.12b If yes how much? (TOTAL)	1.13a Did you bear any cost of purchased and own inputs plus hired labour or any costs of renting land/ collection fees? (yes/no)?	1.13b If yes how much? (TOTAL)	1.14 What is the net revenue? (1.11–1.12b–1.13b) TO BE CALCU-LATED LATER	Notes/ comments
	Quantity used	Sold	Quantity sold	Price per unit		Transport/ market	Costs transport/ market	Inputs	Costs inputs		

HH_MODULE A1 continues on next page

HH_MODULE A1 continued

HH_MODULE A1. INCOME FROM FOREST AND ENVIRONMENTAL PRODUCTS

1.15 During the past 12 (twelve) months have you or any member of your household **processed** any forest products or other wild products (e.g. from grasslands, fallows, etc.), for either your own use or sale? *1 = yes 2 = no >> [NEXT MODULE]*

	Processed product	1.16 Who primarily processed the product? LIST USING INDIVIDUAL ID NUMBER FROM HOUSEHOLD	1.17 How many household members were involved in processing this product?	1.18 Labour (a) In the last 12 months, how many weeks did [HH] spend processing [PRODUCT]? (b) In those weeks, how many days per week were used to process [PRODUCT]? (c) On those days, how many hours per day were spent processing [PRODUCT]?			1.19 What is the total quantity processed (1.21b + 1.22b)?	1.20 What is the unit of product?	1.21a Did you or household use or consume the product? (including gifts and quantity lost/spoilt)? (yes/no)? If no >> [1.22a]	1.21b If yes, what is the quantity?
No.	Code product	Household member	No.	1.18a no. of weeks	1.18b days/ week	1.18c hours/ day	Total quantity	Unit	Use	Quantity used
E	Resin/sap									
	Processed									
F	Processed									
	Charcoal									
	Wooden furniture									
	Other wooden products									
	Alcoholic beverages									
	Other products, specify:									

Codes for household member in questions 1.2 and 1.16: refer to household identification sheet.

	1.22a Did you or household sell the product (including barter)? (yes/no)? If no >> [1.23]	1.22b If yes, what is the quantity?	1.23 What is the price per unit?	1.24 What is the gross value of sales and subsistence (1.19*1.23)? TO BE CALCULATED LATER	1.25a Did you bear any transport/ marketing costs? (yes/no)? If no >> [1.26a]	1.25b If yes, how much? (TOTAL)	1.26a Did you bear any cost of hired labour, rents/fees, purchased and own raw material and inputs used for processing? (yes/no)?	1.26b If yes, how much? (TOTAL)	1.27 What is the net revenue? (1.11–1.12b–1.13b) TO BE CALCULATED LATER
	Sold	Quantity sold	Price per unit		Transport/ market	Costs transport/ market	Costs inputs	Costs inputs	

HH_MODULE A2. OTHER FOREST-RELATED INCOME SOURCES, INCLUDING PAYMENTS FOR ENVIRONMENTAL SERVICES (PES) PROGRAMMES

2.1 During the past 12 months, did your household receive any forest-related payments or income, such as payments for sustainable uses, grazing management, access permits, etc.? *1 = yes* *2 = no >>* [NEXT MODULE]

	PRACTICE	2.2 During the past 12 months, did your household receive any forest-related payments – related to [PRACTICES]? *1 = yes* *2 = no >>* [NEXT PRACTICE]	2.3 What programmes contributed to payment for this [PRACTICE] carried out by the HH?	2.4 What was the total amount paid to the household during the last 12 months from this [PRACTICE]?	2.5 For how many months did your household do this [PRACTICE], during the past 12 months?	2.6 Did your household receive a formal contract to do the [PRACTICE], or in order to receive payment? *1 = yes* *2 = no >>* [NEXT PRACTICE]
		CODE	CODE PROGRAMME (see below)	AMOUNT (local currency)	NUMBER OF MONTHS	CODE
1	Sustainable use of forest (e.g. sustainable logging)					
2	Conservation of parts of forests for biodiversity (e.g. wildlife habitats)					
3	Conservation of parts of forests for watershed protection					
4	Forest fires and pest control practices					
5	Grazing management					
6	Permitting access to forest					
99	Other, specify:					

	2.7 What is the total time length of your contract?	2.8 How many hectares (ha) or trees are included in the contract? CIRCLE THE UNIT USED (ha OR trees)		2.9 What is the total payment per ha or per tree for the duration of the contract?	2.10 What other in-kind benefits have you or will you receive for your participation in the [PROGRAMME]? *1 = household consumption related (incl. food, clothing, fees)* *2 = household wealth related (incl. assets)* *3 = village-level benefits* *4 = other, specify:* *5 = none* >> [2.12]	2.11 What is the value of these in-kind benefits?	2.12 Who is making the payments (cash or in kind) to your household? *1 = NGO/civil society* *2 = government* *3 = municipality* *5 = private sector* *99 = other, specify:*
	NUMBER (years)	NUMBER	UNIT (ha/trees)	AMOUNT (local currency)	CODE	AMOUNT (local currency)	CODE

	2.13 Has your household stopped or reduced [ACTIVITY] due to your participation in the forest payment programme? ACTIVITY	*1 = yes, stopped* *2 = no, still doing* *3 = yes, reduced* *4 = n.a. (wasn't doing [ACTIVITY])*
1	Timber extraction	
2	Fuelwood collection	
3	Other NTFP collection	
4	Hunting	
5	Agricultural production, including crops and livestock	
99	Other, specify:	

CODE PROGRAMME for question 2.3: *1 = payments other than wage or business related to ecotourism; 2 = carbon sequestration/REDD+ scheme; 3 = watershed protection scheme; 4 = biodiversity conservation programme; 5 = payment for use of forest (e.g. from timber or mining companies); 99 = other, specify; 9 = don't know.*

HH_MODULE B: Forest resources – energy, health and construction

In this module, we would like to know how forests and wild products are used for household energy, health and construction.

HH_MODULE B1. FOREST RESOURCE BASE			
1.1 How far is it from the house/homestead to the edge of the nearest natural or managed forest that you have access to and can use?			
a. Measured in terms of distance (one way)? IF LOCAL UNITS OF DISTANCE ARE USED, ENSURE THAT THEY ARE RECORDED AND CONVERTED TO METRIC EQUIVALENTS IN MODULE C UNITS AND PRICING OF COM_MODULE		b. Measured in minutes (one way) of main mode of transport (CHOOSE MAIN MODE USED BY HOUSEHOLD) *1 = walking; 2 = boat; 3 = car/lorry; 4 = bike; 99 = other, specify:*	
NUMBER	UNIT (km/LOCAL UNIT OF DISTANCE)	TRANSPORT CODE	(MIN)

HH_MODULE B2. FORESTS AND ENERGY – FUELWOOD AND CHARCOAL									
	2.1 Have you or anyone in your HH used [PRODUCT] for cooking, lighting, heating or water sterilization in the past 12 months? *1 = yes* *2 = no* >> [NEXT PRODUCT]. If no on both products >> [NEXT MODULE]	2.2 When using [PRODUCT] for *cooking*, how much do you rely on it compared with other energy sources (e.g. gas, electricity)? *0 =not used at all* *1 = very little* *2 = about half of the time* *3 = mostly* *4 = always* *9 = don't know*	2.3 When using [PRODUCT] for *water sterilization*, how much do you rely on it compared with other energy sources (e.g. gas, electricity)? *0 = not used at all* *1 = very little* *2 = about half of the time* *3 = mostly* *4 = always* *9 = don't know*	2.4 When using [PRODUCT] for *heating*, how much do you rely on it compared with other energy sources (e.g. gas, electricity)? *0 = not used at all* *1 = very little* *2 = about half of the time* *3 = mostly* *4 = always* *9 = don't know*	2.5 When using [PRODUCT] for *lighting*, how much do you rely on it compared with other energy sources e.g. gas, electricity? *0 = not used at all* *1 = very little* *2 = about half of the time* *3 = mostly* *4 = always* *9 = don't know*	2.6 Do you purchase any of your [PRODUCT]? *1 = yes* *2 = no* >> [2.8]	2.7 How much of your [PRODUCT] is purchased? *1 = very little* *2 = about half* *3 = most* *4 = all* >> [NEXT PRODUCT] *9 = don't know*	2.8 What is the legal ownership (tenure) status of the land where you mostly collect [PRODUCT]? *1 = communal* *2 = private* *3 = state-owned*	2.9 How easily can your household access this land in practice, without concern for penalties? *1 = very easy* *2 = somewhat easy* *3 = neither difficult nor easy* *4 = somewhat difficult* *5 = very difficult*
PRODUCT	CODE	CODE	CODE	CODE	CODE	CODE	CODE	CODE TENURE	CODE
Fuelwood									
Charcoal									

HH_MODULE B3. FORESTS AND HEALTH							
3.1 Have you or anyone in your household used medicinal plants during the past 12 months? *1 = yes* *2 = no* >> [NEXT MODULE]	3.2 If your household sometimes uses medicinal plants how you obtain these plants? *1 = collect them ourselves* *2 = purchase them at a market or local seller* >> [3.8] *3 = visit a traditional healer for treatment* >> [3.8]	3.3 What is the legal ownership (tenure) status of the land where you obtain medicinal plants? *1 = communal* *2 = private* *3 = state-owned*	3.4 How easily can your household access this land in practice, without concern for penalties? *1 = very easy* *2 = somewhat easy* *3 = neither difficult nor easy* *4 = somewhat difficult* *5 = very difficult*	3.5 Does your household now spend more or less time on getting the plant than you did five years ago? *1 = more* *2 = about the same* *3 = less*	3.6 How has availability of plant changed over the past five years? *0 = no change* >> [3.8] *1 = increased* >> [3.8] *2 = decreased*	3.7 How has your household responded to a lack of medicinal plants? Please list the most important response. *1 = increased collection time (e.g. further away from home)* *2 = found alternative plants for cure* *3 = purchased other drugs/ medicines* *4 = taken preventive measures (e.g. do more exercises)* *5 = cultivated medicinal plants* *6 = did nothing* *99 = other, specify:*	3.8 In general, when you are ill do you prefer to use mostly medicinal plants or modern medicine to treat your illness? *0 = no preference* *1 = medicinal plants* *2 = modern medicine*
CODE	CODE	CODE TENURE	CODE	CODE	CODE	CODE	CODE

HH_MODULE B4. FORESTS AND CONSTRUCTION				
4.1 Did you use any forest/wild products (e.g. timber harvested from local forests, vines, thatch) for this household for construction or maintenance during the past 12 months? *1 = yes* *2 = no* >> [NEXT MODULE]	4.2 If yes, what were the main forest/wild products used? CODE PRODUCT	4.3 How much do you rely on forest/ wild products for construction or maintenance compared with alternatives? *0 = not used at all* *1 = very little* *2 = about half of the time* *3 = mostly* *4 = always* *9 = don't know*	4.4 What is the legal ownership (tenure) status of the land where the products were collected? CODE TENURE *1 = community* *2 = private* *3 = state-owned*	4.5 How easily can your household access this land in practice, without concern for penalties? *1 = very easy* *2 = somewhat easy* *3 = neither difficult nor easy* *4 = somewhat difficult* *5 = very difficult*
CODE	CODE	CODE	CODE TENURE	CODE

HH_MODULE C: Food shortage and crises

In this module, we would like to know how your household uses forest and wild products in times of food shortage and crises.

HH_MODULE C1. FOOD SHORTAGE	
	CODE
1.1 In the last 12 months, have you been faced with a situation when you did not have enough food to feed the household? CODES: *1 = yes 2 = no* >> [NEXT MODULE]	
1.2 How many months in the past 12 months did you not have enough food to feed the household?	
1.3 During the critical months when you did not have enough food to feed the household, did your household consume or use forest or wild products to meet food needs? CODES: *1 = yes 2 = no* >> [NEXT MODULE]	
1.4 How important were forest or wild products in helping your household through the critical months, compared with other resources your household relied on to overcome shortage (for example, drawing on agricultural stocks, borrowing from friends and family, or finding work)? CODES: *1 = very important, we rely primarily on forest products to overcome food shortage* *2 = somewhat important, but we also rely on other resources to overcome food shortage* *3 = no more or less important than other resources we rely on to overcome food shortage* *4 = somewhat unimportant (we generally rely on other resources to overcome food shortage)* *5 = very unimportant (we only rely on forest products when no other options are available)*	
1.5 Please indicate up to three forest and wild products that were used during the months when there was not enough food: CODE PRODUCT	Product 1 Product 2 Product 3
1.6 How did your household (primarily) obtain each of these forest or wild products? CODES: *1 = bought, 2 = collected, 3 = charity/donation, 4 = combination of these*	Product 1 Product 2 Product 3
1.7 What did you do with these forest or wild products? CODES: *1 = consumed all, 2 = consumed and sold for income, 3 = sold all*	Product 1 Product 2 Product 3

HH_MODULE C2. SHOCKS AND CRISES

2.1 During the past 12 months, has your household been severely negatively affected by any of the following events? *1 = yes* *2 = no* >> [NEXT EVENT]. If no to all >> [NEXT MODULE] THIS MODULE IS LINKED TO THE LSMS HOUSEHOLD SURVEY			2.2 Rank the three most significant shocks you experienced *1 = most severe* *2 = second most severe* *3 = third most severe* REMAINING QUESTIONS SHOULD ONLY BE ASKED OF THE THREE MOST SIGNIFICANT SHOCKS NOTED HERE	2.3 Did your household collect or use any forest products to help recover from this [EVENT]? *1 = yes* *2 = no* >> [NEXT EVENT]	2.4 What forest or wild products did your household collect or use? List up to 3 forest/wild products by order of importance			2.5 Did your household primarily consume this product at home, sell it to others, or both? [ACTION] *1 = sell* *2 = consume* *3 = sell and consume*			2.6 Where did you obtain these forest/wild products [SOURCE]? USE CODES BELOW FOR [SOURCE]			2.7 How important were forest/wild products for helping your household to recover to your usual condition? *0 = not important at all* *1 = a little bit important* *2 = somewhat important* *3 = equally important with other steps my household took to recover* *4 = more important than other* *5 = most important for helping my household to recover*
					1st			2nd			3rd			
SHOCK CODE from LSMS	EVENT	CODE	CODE FOR THREE BIGGEST SHOCKS	CODE	PRODUCT	ACTION	SOURCE	PRODUCT	ACTION	SOURCE	PRODUCT	ACTION	SOURCE	CODE
100	drought													
101	floods													
102	crop disease or crop pests													
103	livestock died or were stolen													
104	household business failure (non-agricultural)													
105	loss of salaried employment or non-payment of salary													
106	large fall in sale prices for crops													
107	large rise in price of food													
108	large rise in agricultural input prices													
109	severe water shortage													
110	loss of land													

HH_MODULE C2 continues on next page

HH_MODULE C2 continued

HH_MODULE C2. SHOCKS AND CRISES

2.1 During the past 12 months, has your household been severely negatively affected by any of the following events? *1 = yes* *2 = no* >> [NEXT EVENT]. If no to all >> [NEXT MODULE] THIS MODULE IS LINKED TO THE LSMS HOUSEHOLD SURVEY			2.2 Rank the three most significant shocks you experienced *1 = most severe* *2 = second most severe* *3 = third most severe* REMAINING QUESTIONS SHOULD ONLY BE ASKED OF THE THREE MOST SIGNIFICANT SHOCKS NOTED HERE	2.3 Did your household collect or use any forest products to help recover from this [EVENT]? *1 = yes* *2 = no* >> [NEXT EVENT]	2.4 What forest or wild products did your household collect or use? List up to 3 forest/wild products by order of importance *1 = sell* *2 = consume* *3 = sell and consume*			2.5 Did your household primarily consume this product at home, sell it to others, or both? [ACTION]			2.6 Where did you obtain these forest/wild products [SOURCE]? USE CODES BELOW FOR [SOURCE]			2.7 How important were forest/wild products for helping your household to recover to your usual condition? *0 = not important at all* *1 = a little bit important* *2 = somewhat important* *3 = equally important with other steps my household took to recover* *4 = more important than other* *5 = most important for helping my household to recover*
					1st			2nd			3rd			
SHOCK CODE from LSMS	EVENT	CODE	CODE FOR THREE BIGGEST SHOCKS	CODE	PRODUCT	ACTION	SOURCE	PRODUCT	ACTION	SOURCE	PRODUCT	ACTION	SOURCE	CODE
111	chronic/severe illness or accident of household member													
112	death of a member of household													
113	break-up of the household													
114	household member jailed													
115	fire													
116	hijacking/robbery/burglary/ assault													
117	dwelling damaged, destroyed													
118	other/specify:													

CODES SOURCE: *1 = old-growth primary/natural forest; 2 = secondary or regenerating natural forest; 3 = managed plantation forest; 4 = non-forest tree-based wild systems (savannahs, fallows) 5 = non-forest tree-based cultivated systems (trees on farms, woodlots, agroforestry); 6 = non-forest natural systems with natural vegetation (grassland, scrubland, rangelands, mosaic landscapes); 7 = purchased by household; 8 = donated/given by relatives or other; 99 = other, specify:*

Extended household questionnaire

HH_MODULE D: FOREST CHANGES AND CLEARANCE

This extended HH_Module is aimed at understanding the changes to the forest used by the household, and extent and purpose of forest clearance.

HH_MODULE D1. FOREST CHANGES	
1.1 Has there been any change in areas of natural forest cover in your village in the past five years? *0 = no change* >> [NEXT MODULE] *1 = increased* *2 = decreased*	1.2 What is the main reason for the change in natural forests? *1 = agriculture expansion/reduction* *2 = expansion/reduction resulting from livestock* *3 = climate change/natural disasters* *4 = rural-to-urban migration* *5 = wars/conflicts* *6 = urban-to-rural migration* *7 = change in land tenures* *8 = small-scale timber extraction* *9 = large-scale timber extraction* *10 = forest protection projects/legislation* *11 = infrastructure development (e.g. road, electricity)* *12 = economic crisis* *13 = ecotourism development* *14 = new or revised forest legislation* *99 = other, specify:*
CODE	CODE CHANGE

HH_MODULE D2. FOREST CLEARANCE			
2.1 Over the last five years, has the household cleared any forest? *1 = yes* *2 = no* >> [2.3]			
2.2 Approximately how much forest area (TOTAL) did the household clear over the last five years?	NUMBER	UNIT	
2.3 Has any of the forest been cleared communally? *1 = yes* *2 = no* >> [2.5]			
2.4 Approximately how much forest area (TOTAL) did the community clear over the last five years?	NUMBER	UNIT	
2.5 Over the last five years, how much of the land used in general by the household has been abandoned (left to convert to natural revegetation)?	NUMBER	UNIT	
2.6 Has your household planted any trees over the past five years? *1 = yes* *2 = no* >> [2.9 or NEXT MODULE if 2.1 = no]			
2.7 Over the past five years, how many trees (including trees on farm) have been planted, and over how many hectares/local units were they planted? INDICATE TOTAL NUMBER OF TREES IN THE FIRST COLUMN AND TOTAL AREA OF LAND WHERE THEY WERE PLANTED IN THE SECOND COLUMN.	NO. OF TREES	NO. OF UNIT	UNIT

HH_MODULE D2 continues on next page

HH_MODULE D2 continued

HH_MODULE D2. FOREST CLEARANCE		
2.8 What are the main purpose(s) of the trees planted? RANK THE THREE MOST IMPORTANT RESPONSES FROM CODES BELOW *1 = fuelwood for domestic use* *2 = fuelwood for sale* *3 = fodder for own use* *4 = fodder for sale* *5 = timber/poles for own use* *6 = timber/poles for sale* *7 = medicinal purposes (e.g. neem)* *8 = food purposes (e.g. fruit)* *9 = other domestic uses* *10 = other products for sale* *99 = other, specify:* *11 = carbon sequestration* *12 = other environmental services* *13 = for shading of agriculture* *14 = reducing soil erosion* *15 = aesthetic reasons* *16 = land demarcation* *17 = to increase the value of land* *18 = to allow children/ grandchildren to see these trees* *19 = to improve soil fertility* *20 = to improve crop yields*	Rank 1 Rank 2 Rank 3	
2.9 Of the amount of forest cleared by your household in the past five years, was any of this forest cleared during the past 12 months? *1 = yes* *2 = no* >> [2.13]		
2.10 How much (total) forest area was cleared over the past 12 months? IF LOCAL UNITS FOR AREA ARE USED, ENSURE THAT THEY ARE RECORDED AND CONVERTED TO METRIC EQUIVALENTS IN MODULE C UNITS AND PRICING OF COM_MODULE	NUMBER	UNIT
2.11 For what primary purpose was the forest cleared during the past 12 months? Rank the three most important reasons. *1 = cropping* *2 = tree plantation* *3 = pasture* *4 = non-agricultural uses* *5 = timber extraction* *6 = charcoaling* *99 = other, specify:*	Rank 1 Rank 2 Rank 3	
2.12 If used for cropping (code 1 in question above), which principal crops were grown? (CODE PRODUCT) RANK THE THREE PRINCIPAL CROPS	Rank 1 Rank 2 Rank 3	
2.13 What type of forest did you clear? (CODE ORIGIN, see below)		
2.14 If secondary forest, what was the age of the forest?		YEARS
2.15 What was the legal ownership status of the forest cleared? (CODE TENURE) *1 = community 2 = private 3 = state-owned*		

HH_MODULE D2 continues on next page

HH_MODULE D2 continued

HH_MODULE D2. FOREST CLEARANCE		
2.16 How easy is it for your household to access this forest land in practice, without concern for penalties? *1 = very easy* *2 = somewhat easy* *3 = neither difficult nor easy* *4 = somewhat difficult* *5 = very difficult*		
2.17 How far is it from the house/homestead to the edge of the forest that you have cleared measured in terms of distance (one way)? IF LOCAL UNITS OF DISTANCE ARE USED, ENSURE THAT THEY ARE RECORDED AND CONVERTED TO METRIC EQUIVALENTS IN COM_ MODULE C UNITS AND PRICING.	NUMBER	UNIT

CODE ORIGIN: *1 = old-growth natural forest; 2 = secondary/regenerating natural forest; 3 = managed plantation forest; 4 = non-forest tree-based wild systems, e.g. savannah and fallows; 5 = non-forest tree-based cultivated systems with planted trees, trees on farms or tree farms; 6 = non-forest natural (non-wood) systems with natural vegetation; 99 = other, specify:*

Wild fruits collected by Mchakama villagers (United Republic of Tanzania).

© L. PERSHA

Annex C
Additional modules/templates for non-LSMS-type surveys

(1) Templates for basic data at household and community level
I. Identification of household
II. Basic information on household members
III. Identification of principal respondents
I. Identification prior to community meeting
II. List of participants at community meeting

(2) Extra modules on forest-related income and assets
EXT_Module A3. Wage income
EXT_Module A4. Business income
EXT_Module A5. Forest-related assets

C1. Templates for basic data at household and community level

A. Household level

I. IDENTIFICATION OF HOUSEHOLD			
INTERVIEWER		DATE OF INTERVIEW	
		COPIED/SCANNED/ PHOTOGRAPHED? *1 = yes 2 = no*	
TIME START (HH/MM)		TOTAL DISCUSSION TIME (HH/MM)	
TIME END (HH/MM)			
CHECKED BY (NAME)		CHECKED BY (DATE)	

Before the interview please give a short introduction, which explains who we are, the objectives of the interview, how we select households and respondents, the interview process and the confidentiality of answers, and finally asks for informed consent.

We are from [NAME OF ORGANIZATION]. We are [ORGANIZATION'S OBJECTIVE]. We are interested in the role of forest and wild products in livelihoods, to determine the contribution of forests and trees outside forests to household welfare in this village.

We are randomly selecting [NUMBER] villages and [NUMBER] households to test this survey. Your household is one of the selected households. We have visited the head of [VILLAGE NAME], and have his/her permission to carry out this interview.

You may stop the discussion at any point and ask questions or request an explanation. All information is confidential. Your name will not be connected with your answers, and will not be shared with anyone other than our team. This interview is voluntary and we thank you for participating in the survey. If you agree to start this interview then you are agreeing that you may be interviewed. May we start now? ☐ YES ☐ NO

II. BASIC INFORMATION ON HOUSEHOLD MEMBERS (add rows as needed)
We would like to ask you about the basic information of all members of the household (please refer to definitions of "household").

1. No.	2. Name of household member	3. Relation to HH head CODES BELOW	4. Gender *0 = male* *1 = female*	5. Age in years	6. Education in years
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Note that only activities of household members should be collected/documented.

Codes for column 3: relationship to head of household

1 = head of household	*6 = father/mother*	*11 = niece/nephew*
2 = spouse	*7 = father-in-law/mother-in-law*	*12 = stepchild/adopted child*
3 = son/daughter	*8 = brother/sister*	*13 = other family members*
4 = son-in-law/daughter-in-law	*9 = brother-in-law/sister-in-law*	*14 = members not related to household head*
5 = grandson/granddaughter	*10 = uncle/aunt*	

III. IDENTIFICATION OF PRINCIPAL RESPONDENTS
List the numbers (from column 1 of Table II) and the names (from column 2 of Table II) of the two principal respondents. If there is only one respondent use code -8 for second entry.

No.	Name	Contact
No.	Name	Contact

B. Community level

I. IDENTIFICATION PRIOR TO COMMUNITY MEETING			
NOTE TAKER		DATE OF FOCUS GROUP DISCUSSION	
FACILITATOR		COPIED/SCANNED/ PHOTOGRAPHED? *1 = yes 2 = no*	
TIME START (HH/MM)		TOTAL DISCUSSION TIME (HH/MM)	
TIME END (HH/MM)			
CHECKED BY (NAME)		CHECKED ON (DATE)	

Before the discussion please give a short introduction, which explains who we are, the objectives of the focus group discussion and the confidentiality of answers, and finally ask for informed consent.

We are from [NAME OF ORGANIZATION]. We are [ORGANIZATION'S OBJECTIVE]. We are interested in the role of forest and wild products in livelihoods, to determine the contribution of forests and trees outside forests to household welfare in this village.

We are randomly selecting [NUMBER] villages to test this survey. Your village is one of these. We have visited the head of [VILLAGE NAME], and have his/her permission to carry out this group discussion.

You may stop the discussion at any point and ask questions or request an explanation.

All information is confidential. Your name will not be connected with your answers, and will not be shared with anyone other than our team. This discussion is voluntary and we thank you for participating in the survey.

Does everyone agree to participate in this discussion? ☐ YES ☐ NO

II. LIST OF PARTICIPANTS AT COMMUNITY MEETING (add rows depending on number of participants)					
No.	Participant name	Occupation	Gender (M/F)	Age	Village/ neighbourhood
1					
2					
3					
4					
5					

C2. Forest-related wage income

For those not using the LSMS-type household survey, Module A3 below covering wage income could be used. Extended HH_Module A3 (forest-related wage income) only relates to occupations linked to forests, with the aim of understanding the employment benefits provided by forests.

EXT_MODULE A3. FOREST-RELATED WAGE INCOME
Note: only to be implemented if used as a stand-alone survey.

3.1 During the past 12 months have you or any member of your household done any kind of wage work related to forestry, non-timber forest products, or payments for environmental services?	*1 = yes* *2 = no* >> [NEXT MODULE]

MODULE A3. FOREST-RELATED WAGE INCOME (add rows as needed) We would like to ask you about the basic information of all members of the household (please refer to definitions of "household").	3.2 Household member NOTE: ONE PERSON CAN BE LISTED MORE THAN ONCE FOR DIFFERENT JOBS. PLEASE RECORD ONE JOB PER ROW.	3.3 What kind of work does [HOUSEHOLD MEMBER] usually do in this job? **WRITE DESCRIPTION USING UP TO FIVE WORDS; THEN ADD OCCUPATION CODE**		3.4a What payment does [HOUSEHOLD MEMBER] typically receive for this work?	3.4b What is the period of time covered by these payments? [CODE PERIOD UNIT] *1 = hour* *2 = day* *3 = week* *4 = month* *5 = year* *6 = unit, specify:* *99 = other; specify:*	3.5 During the last 12 months, how many months did [HOUSEHOLD MEMBER] work this job? (MAXIMUM AMOUNT: 12 MONTHS)	3.6 During the last 12 months, how many weeks per month did [HOUSEHOLD MEMBER] work this job? (MAXIMUM AMOUNT: 4 WEEKS)	3.7 During the last 12 months, how many hours per week did [NAME] work this job? (MAXIMUM AMOUNT: 168 HOURS	3.8 Total wage income TO BE CALCULATED LATER
No.	Household member [individual ID number]	Description	Code occupation	Monetary value (local currency)	Code period unit	Months	Weeks	Hours	

Note: CODES OCCUPATION: for question 3.3: *1 = forestry – logging, 2 = forestry – processing (e.g. charcoal, sawn wood), 3 = forestry – transport, 4 = forestry – other, 5 = NTFP – harvesting, 6 = NTFP – processing, 7 = NTFP – transport, 8 = NTFP – marketing/management, 9 = forest guard/ranger, 10 = forest guide/tourism, 11 = PES-related, 12 = handicraft manufacture, 13 = carpentry, 99: other, specify:*

C3. Forest-related business income

For those not using the LSMS-type household survey, this module covering business income could be used. The Extended HH_Module A4 (forest-related business income) below aims to demonstrate the business benefits derived from forests, but does not include forest product processing, which is captured under HH_Module A1: Income.

EXT_MODULE A4. FOREST-RELATED BUSINESS INCOME						
Note: only to be implemented if used as a stand-alone survey. Complete one column for each business. Do not include any types of forest/wild product processing done using raw materials collected by the household – this should be recorded under Module A1.						
4.1 During the past 12 months, did you or any member of your household own any types of business related to forestry, NTFPs, or payments for environmental services?				*1 = yes* *2 = no >>* [NEXT MODULE]		
	Business 1 description (five words)	Business 1 code	Business 2 description (five words)	Business 2 code	Business 3 description (five words)	Business 3 code
4.2 What is your type of business? Please provide a short description of each forestry-related business that your household operated during the past 12 months. What is the main product sold or service provided? CODE BUSINESS: *1 = trade of forest product* *2 = handicraft manufacturing* *3 = carpentry* *4 = timber processing* *5 = logging* *6 = other forest-based (e.g. NTFP collection)* *7 = other business organizing/ skilled labour in forest-related activity (e.g. ranger service)* *8 = transport of forest product (e.g. car, boat)* *9 = ecotourism-related (e.g. guiding service, eco-guesthouse)* *10 = herbalist/traditional healer* *11 = contracted work for forest product/service management* *12 = renting out equipment for forest product/service management* *99 = other, specify:*						
4.3 What was your total gross income (sales) from your [BUSINESS] in the last 12 months?						
4.4 What was your net revenue (profit) from your [BUSINESS] in the last 12 months?						

EXT_MODULE A4 continues on next page

EXT_MODULE A4 continued

EXT_MODULE A4. FOREST-RELATED BUSINESS INCOME						
COSTS:						
4.5 How many employees do you have who are not household members?						
4.6 What was your total expenditure on wages/salary in the last 12 months?						
4.7 What was your total expenditure on raw materials/ other inputs (e.g. pesticides, fertilizer, vaccines, etc.) used for your business in the last 12 months?						
4.8 What was your total transport and marketing cost in the last 12 months?						
4.9 What were your other operating expenses (for this business) such as fuel, kerosene, electricity, etc. in the past 12 months?						
4.10 What was the value of any other costs (not covered above) related to this business?						
4.11 How many months during the last 12 months did you operate this business?						
4.12 What is the current value of your capital stock?						

C4. Forest-related assets

For those not using the LSMS-type household survey, this assets module has been developed. Forest-related assets are important to capture, as they can indicate particular collection activities around certain forest resources (e.g. timber), and may indicate long-term sustainability of the particular product and its resource base. Certain assets may be illegal; therefore extracting this information may be sensitive.

EXT_MODULE A5. FOREST-RELATED ASSETS						
Note: only to be implemented if used as a stand-alone survey. These assets should include all the assets used for the collection and trade of forest-based products and services. **Note: add rows as needed.**						
5.1 Does your household own forest-related assets (e.g. implements, transport, furniture)?					*1 = yes* *2 = no >>* [NEXT MODULE]	
Code	Asset	5.2 Does your household currently own [ASSET]? *1 = yes* *2 = no >>* [NEXT ITEM]	5.3 How many [ASSET] does your household currently own	5.4 What is the age of [ASSET] owned by your household? IF MORE THAN ONE, ASK FOR THE AGE OF MOST VALUABLE [ASSET].	5.5 If you wanted to sell this [ASSET] today, how much money would you receive? IF MORE THAN ONE, ASK FOR THE AVERAGE VALUE OVER ALL (ASSET)	5.6 How often does your household use this [ASSET] for forest-related activities? *1 = very rarely, only once or twice per year* *2 = not often, but at least several times per year* *3 = at least once or twice per month* *4 = often, several times per month* *5 = very often, several times per week*
		CODE	NUMBER OWNED	AGE (years)	VALUE (local currency)	CODE
	TRANSPORT					
	horse					
	donkey					
	bicycle					
	truck					
	boat – motorized					
	boat – non-motorized					
	car					
	motorbike					
	IMPLEMENTS					
	chainsaw					
	shotgun/rifle					
	axe					
	mobile, small-scale sawmill					

C5. Regulating and supporting environmental services

These modules were field-tested in three countries (see Section 5). Several difficulties were found to be associated with implementing them. Consequently, they were dropped from the forestry modules. Users may improve and use them as needed.

This section is largely built on household perceptions (see Section 4). HH_Module F1 provides data on perceived climate change and variability, perceived impacts of such changes and variability on forests, and impacts of such changes on the general household

condition (food availability, income, assets, health, etc.). It explores whether households use forest-based responses to respond to negative effects on general household conditions, and whether households perceive these changes as a threat to their future welfare.

HH_Module F2 elicits information on forest-related adaptation strategies performed by households, and is again based on household perceptions. Specifically, it documents adaptation strategies and households' ability to implement them, as well as possible constraints. It also explores household perceptions of effectiveness of these strategies in improving livelihoods and reducing climate change impacts on the household, and at the general level. Information regarding the potential of forests in adaptation to climate change is largely lacking, so generating this type of information will help to align forest adaptation strategies with mitigation actions, and identify areas for synergies between the two.

Data on environmental services could help to answer the following questions:

- How do local communities experience climate change impacts, and how well do these perceptions match with actual impacts?
- What are the main constraints facing households in adapting to climate change, and how effective do households believe these strategies are?

HH_Module F3 on forest services is designed to collect data on whether households have benefited from a range of forest environmental services, with the aim of qualitative documentation through ranking the top three most important services that households feel they have benefited from.

EXT_MODULE F: REGULATING AND SUPPORTING ENVIRONMENTAL SERVICES

This HH_Module is aimed at understanding household perceptions and strategies to adapt to climate change.

EXT_MODULE F1. CLIMATE CHANGE AND VARIABILITY							
	EFFECT	1.1 In the past five years, have you observed any changes in [EFFECT] in your village? *0 = no change* *1 = increased* *2 = decreased*	1.2 In your opinion, has this change in [EFFECT] negatively affected the forests where you normally collect forest products? *1 = yes* *2 = no*	1.3 What major changes to your household condition, if any, have you experienced as a result of this change in [EFFECT]? Please describe the two most important changes in your household condition. **ENUMERATORS: WRITE BRIEF DESCRIPTION OF CHANGE, THEN ADD CORRESPONDING CODE(S) BELOW (multiple codes per effect are OK).** HOUSEHOLD CONDITION CODES: *0 = no major change to household condition* *1 = increase in availability of food* *2 = decrease in availability of food* *3 = increase in income* *4 = decrease in income* *5 = increase in assets* *6 = decrease in assets* *7 = increase in health* *8 = decrease in health* *99 = other change, specify:*		1.4 Has your household collected or harvested any forest or wild products to help with this change in [HOUSEHOLD CONDITION]? *1 = yes often* *2 = no, not at all* *3 = yes, sometimes*	1.5. In your opinion, do you think that a change in [EFFECT] will be a threat to your household's welfare in the future? *1 = yes, strongly* *2 = yes, somewhat* *3 = no opinion* *4 = no, not very much* *5 = no, not at all* *99 = don't know*
				Brief text description	CODE		
1	temperature						
2	precipitation						
3	frequency and severity of floods						
4	frequency and severity of fires						
5	frequency and severity of drought						
6	availability of natural water bodies in forest						
99	other, specify:						

EXT_MODULE F2. ADAPTATION STRATEGIES							
	ACTIVITY	2.1 In the past 12 months, has any member of your household done any of the following [ACTIVITY]? *1 = yes >> [2.4]* *2 = no*	2.2 Does your household want to do [ACTIVITY] but is not able to implement this activity? *1 = yes;* *2 = no >> [NEXT MODULE]*	2.3 What is the main constraint for not being able to do [ACTIVITY]? *1 = lack of money* *2 = lack of knowledge* *3 = lack of labour* *4 = lack of land access* *5 = lack of technology/ tools/ infrastructure* *99 = other, specify:*	2.4 In your opinion, has your household condition improved as a result of doing this [ACTIVITY]? *1 = yes* *2 = no*	2.5 In your opinion, to what extent has this [ACTIVITY] helped your household to reduce any negative effects from climate change that you feel your household has experienced? *1 = it has not been helpful until now* *2 = somewhat helpful until now* *3 = very helpful until now*	2.6 In your opinion do you consider this [ACTIVITY] in general to be an effective strategy to reduce the effects of climate variability mentioned above (1.1)? *1 = yes* *2 = no* *3 = partly*
1	planted trees						
2	reduced the amount of forest land that your household clears						
3	protected trees on your farm						
4	practised agro-forestry or silvipasture						
5	changed or expanded the types of different ways your household gets income from forests						
6	changed the harvesting time of forest products						
99	other, specify:						

EXT_MODULE F3. FOREST SERVICES				
3.1 During the past 12 months has your household benefited from any FOREST SERVICES [see list of services below] in or from the forest?	READ OUT ALL FOREST SERVICES, AND INDICATE CODE *1 = yes* *2 = no*	3.2 Of the services that your household has benefited from, please rank the three most important.		
FOREST SERVICE	CODE	Rank 1	Rank 2	Rank 3
CODES: *1 = freshwater/water conservation* *2 = livestock grazing/browsing inside forest* *3 = shade (e.g. for livestock)* *4 = soil protection, erosion control (e.g. nearby agricultural fields or waterways)* *5 = natural windbreak* *6 = recreation/tourism* *7 = services to agriculture (e.g. pollination of agricultural crops by forest insects, control of agricultural pests by proximity to forest)* *8 = religious/cultural/spiritual values* *9 = aesthetic* *10 = education/scientific studies* *11 = climate regulation* *99 = other, specify:*				

The field team moving to the next village.
The river connects one village to the next (Indonesia).

© I.W. BONG

Annex D
Integrated forestry modules

Questions to be integrated with existing questionnaires of the Living Standards Measurement Study – Integrated Survey on Agriculture (LSMS-ISA).

Conventions

Module/section and question number refer to the original questionnaire such as MODULE/SECTION E: TIME USE AND LABOUR, E01. Modifications to existing questions/codes are in ***bold italics***.

New questions in an existing section have two-part numbers. The first part refers to the original question in the LSMS surveys, after which the new question is to be inserted. The second part refers to the order of insertion. For example, Q27 + 2 indicates that this is the second question to be inserted after question 27.

New codes to an existing question also have two-part numbers. The first part refers to the original code, after which the new code is to be inserted; the second part refers to the order of insertion. For example, 8 + 1 indicates that this is the first code to be inserted after existing code number 8.

Example of United Republic of Tanzania

Integrated household LSMS survey

The following questions are to be inserted in the national panel survey (NPS 2012/2013), household and individual questionnaire, United Republic of Tanzania. The questions follow the order of insertion in the main module.

SECTION D: HEALTH
Insert between questions 9 and 10

INDIVIDUAL ID	9 + 1 How much in total (in kind/cash) did the household spend on [NAME] in the past four weeks for medicinal plants?
1	
2	

SECTION E: LABOUR
Modify existing questions 4e and 8e; 66–69

INDIVIDUAL ID	4e In the last 12 months, did [NAME] work on household agricultural activities (including farming, raising livestock, fishing ***or harvesting forest products***, whether for sale or for household food) even if just for one hour?	8e In the last 7 days, did [NAME] work on household agricultural activities (including farming, raising livestock, fishing ***or harvesting forest products***, whether for sale or for household food) even if just for one hour?	...	66 During the last 12 months, how many months did [NAME] spend on household agricultural activities (including livestock, fishing ***or harvesting forest products***, whether for sale or for household food)? MAX AMOUNT: 12 MONTHS	67 During the last 12 months, how many weeks per month did [NAME] spend on household agricultural activities (including livestock, fishing ***or harvesting forest products***, whether for sale or for household food)? MAX AMOUNT: 5 WEEKS	68 During the last 12 months, how many hours per week on household agricultural activities (including livestock, fishing ***or harvesting forest products***, whether for sale or for household food)? MAX AMOUNT: 168 HOURS	69 In the last 7 days, how many hours did [NAME] spend on household agricultural activities (including livestock, fishing ***or harvesting forest products***, whether for sale or for household food)? MAX AMOUNT: 168 HOURS
1							
2							
3							

Add forest-related work codes to CODE: ISIC SECTOR in E21

SECTION H: FOOD SECURITY
Insert question 10

10 + 1 What products, if any, did your household consume ***only*** when there was not enough food? List up to three products by order of importance (CODE PRODUCT)			10 + 2 Did your household consume ***forest products*** to meet food needs when there was not enough food? *1 = yes* >> [3] *2 = no* >> [NEXT SECTION]	10 + 3 List up to three ***forest products*** by order of importance consumed by your household when there was not enough food. CODE PRODUCT			10 + 4 How important were forest or wild products in helping your household through the critical months, compared with other resources your household relied on to overcome food shortage (for example, drawing on agricultural stocks, borrowing from friends and family, or finding work)? CODES: *1 = very important, we rely primarily on forest products to overcome food shortage* *2 = somewhat important, but we also rely on other resources to overcome food shortage* *3 = no more or less important than other resources we rely on to overcome food shortage* *4 = somewhat unimportant (we generally rely on other resources to overcome food shortage)* *5 = very unimportant (we only rely on forest products when no other options are available*
1st	2nd	3rd		1st	2nd	3rd	

SECTION J: CONSUMPTION OF FOOD OVER PAST WEEK
Add specific forest products to the ITEM CODE as relevant to the context.

SECTION K: NON-FOOD EXPENDITURES – PAST ONE WEEK AND ONE MONTH
Modification of ITEM CODE "207 Charcoal" under "ONE MONTH RECALL" into "207 Charcoal/ Fuelwood"

SECTION M: HOUSEHOLD ASSETS
Add specific forest-related assets to CODE

SECTION N: FAMILY/HOUSEHOLD NON-FARM ENTERPRISES
Add specific codes for forest-related businesses

SECTION O: ASSISTANCE AND GROUPS
Add to codes for question 1 between "E. Scholarships or bursaries for secondary school" and "F Other assistance (not listed above), specify:"

SECTION M: HOUSEHOLD ASSETS
Add specific forest-related assets to CODE

SECTION M: HOUSEHOLD ASSETS
Add specific forest-related assets to CODE

E + 1 PAYMENT FOR ECOTOURISM
E + 2 PAYMENT FOR CARBON SEQUESTRATION/REDD+ SCHEME
E + 3 PAYMENT FROM BIODIVERSITY CONSERVATION PROGRAMME
E + 4 PAYMENT FROM WATERSHED PROTECTION PROGRAMME
E + 5 PAYMENT FOR USE OF FOREST (E.G. FROM TIMBER OR MINING COMPANIES)
E + 6 OTHER FOREST-RELATED SUPPORT (E.G. FREE SEEDLINGS, FORESTRY IMPLEMENTS, GROWTH/ PROTECTION INPUTS)

SECTION R: RECENT SHOCKS AND HOUSEHOLD WELFARE
Add to the codes for question 6 between "18. ENGAGED IN SPIRITUAL EFFORTS – PRAYER, SACRIFICES, DIVINER CONSULTATIONS" and "19. DID NOT DO ANYTHING"
18. + 1 HARVESTED PRODUCTS INSIDE THE FOREST FOR SALE
18. + 2 HARVESTED PRODUCTS INSIDE THE FOREST FOR OWN CONSUMPTION
18. + 3 HARVESTED WILD PRODUCTS OUTSIDE THE FOREST FOR SALE
18. + 4 HARVESTED WILD PRODUCTS OUTSIDE THE FOREST FOR OWN CONSUMPTION

SECTION U-2: FILTER QUESTIONS
Insert between questions 8 and 9.
8. + 1 Did anyone in this household harvest, process or sell forest products in the last 12 months?
1 = yes, 2 = no
Modification of question 9
9. PROCEED TO LIVESTOCK/FISHERY/***FORESTRY*** MODULE

NOTE: OTHER INCOME relating to income from forest/environmental services was not included in the Tanzania LSMS survey, so questions relating to forest-related OTHER INCOME were not included. See Malawi LSMS Household Survey for suggestions of questions to be integrated.

Integrated community LSMS survey

The following questions are to be inserted in the national panel survey (2012/2013), community questionnaire, United Republic of Tanzania. The questions follow the order of insertion in the main module.

SECTION CE: DEMOGRAPHICS, LAND AND LIVESTOCK
Insert between questions 4 and 5

1. Are there any farmers' cooperative groups in this village? *1 = yes* *2 = no* >> [4 + 1]	1....4	4 + 1 Are there any formal or informal groups of people who undertake forest-related activities in this village? *1 = yes,* *2 = no* >> [5]	4 + 2 How many different such groups are there in the community? NUMBER	4 + 3 How many people participate in these groups in total? NUMBER	4 + 4 Which of the following activities do the group members do as a group? CIRCLE ALL THAT APPLY *1 = set rules for use* *2 = monitor and police* *3 = silviculture and management* *4 = harvest forest products* *5 = sell forest products* *6 = plant trees* *7 = related to tourism (i.e. maintain tourist infrastructure; guide tourists, etc.)* *8 = related to education/ extension support* *9 = provide savings and credit* *99 = other, specify...*

SECTION CF: MARKET PRICES
Add specific forest products to the ITEM CODE as relevant to the context.

SECTION CG: LOCAL UNITS
Add specific forest products to the ITEM CODE as relevant to the context.

SECTION CH: FILTER QUESTIONS (TO BE ADDED)
Did anyone in this community harvest, process or sell forest products in the last 12 months?
1 = yes, 2 = no
If yes, PROCEED TO COMMUNITY ***FORESTRY*** MODULES.

Example of Malawi

Integrated household LSMS survey

The following questions are to be inserted in the third integrated household survey, 2010/11, household questionnaire, Malawi. The questions follow the order of insertion in the main module.

MODULE E: TIME USE AND LABOUR
Insert between E07 and E08

ID CODE	E07 + 1 How many hours did you spend in the last seven days ***harvesting timber and non-timber-forest-products (NTFPs) (excluding fuelwood) in the forest, including cutting and extraction?***	E07 + 2 How many hours did you spend in the last seven days ***processing timber and NTFPs***?	E07 + 3 In addition to forest products and fish/ aquatic products, how many hours did you spend in the last seven days ***collecting raw products in other environments (e.g. grasslands, fallows, etc.)***?	E07 + 4 How many hours did you spend in the last seven days ***hunting***?
1				
2				
3				
4				

Add forest-related work codes to OCCUP.CODE in E19

MODULE G: FOOD CONSUMPTION OVER PAST WEEK
Add specific forest products to the ITEM CODE as relevant to the context.

MODULE H: FOOD SECURITY
Insert after H06

H06 + 1 What products, if any, did your household consume ***only*** when there was not enough food? List up to three products by order of importance. CODE PRODUCT			H06 + 2 Did your household consume ***forest products*** to meet food needs when there was not enough food? *1 = yes* >> [3] *2 = no* >> [NEXT SECTION]	H06 + 3 List up to three ***forest products*** by order of importance consumed by your household when there was not enough food. CODE PRODUCT			H06 + 4 How important were forest or wild products in helping your household through the critical months, compared with other resources your household relied on to overcome food shortage, (for example, drawing on agricultural stocks, borrowing from friends and family, or finding work)? CODES: *1 = very important, we rely primarily on forest products to overcome food shortage* *2 = somewhat important, but we also rely on other resources to overcome food shortage* *3 = no more or less important than other resources we rely on to overcome food shortage* *4 = somewhat unimportant (we generally rely on other resources to overcome food shortage)* *5 = very unimportant (we only rely on forest products when no other options are available)*
1st	2nd	3rd		1st	2nd	3rd	

MODULE N: HOUSEHOLD ENTERPRISES
Modify N04
N04 … offered any service or sold anything on a street or in a market, including ***raw forest products and processed forest products***?
Insert after N07
N07 + 1 … owned a forest-related business?

MODULE P: OTHER INCOME
Add to the codes for income sources the section on payment for environmental services
116 + 1 Payment for ecotourism
116 + 2 Payment for carbon sequestration/REDD+ scheme
116 + 3 Payment from biodiversity conservation programme
116 + 4 Payment from watershed protection programme
116 + 5 Payment for use of forest (e.g. from timber or mining companies)
116 + 6 Other forest-related support (e.g. free seedlings, forestry implements, growth/protection inputs)

MODULE U: SHOCKS AND COPING STRATEGIES
Add to the codes for U04 between 18. ENGAGED IN SPIRITUAL EFFORTS – PRAYER, SACRIFICES, DIVINER and 19. DID NOT DO ANYTHING
18 + 1 HARVESTED PRODUCTS INSIDE THE FOREST FOR SALE
18 + 2 HARVESTED PRODUCTS INSIDE THE FOREST FOR OWN CONSUMPTION
18 + 3 HARVESTED WILD PRODUCTS OUTSIDE THE FOREST FOR SALE
18 + 4 HARVESTED WILD PRODUCTS OUTSIDE THE FOREST FOR OWN CONSUMPTION

HEALTH: the Health Module is not included in the Malawi LSMS Household Survey so questions pertaining to medicinal plant use were not included. If included, questions as shown in Tanzania LSMS Household Survey could be added.

Integrated community LSMS survey

The following questions are to be inserted in the third integrated household survey, 2010/11, community questionnaire, Malawi. The questions follow the order of insertion in the main module.

MODULE CE: ECONOMIC ACTIVITIES
Add to ECONOMIC ACTIVITY CODES BETWEEN 2. FISHING and 3. FIREWOOD, CHARCOAL SELLING
2 + 1 HUNTING
2 + 2 TIMBER SELLING
2 + 3 MEDICINAL PLANTS SELLING
2 + 4 WILD FOODS (e.g. FRUITS, MUSHROOMS, VEGETABLES, BEVERAGES) SELLING
2 + 5 AQUATIC PRODUCTS (e.g. SHRIMPS, CRABS, LOBSTERS) SELLING

MODULE CF: AGRICULTURE
Insert after CF17

CF1 Do any households farm crops or keep livestock in this community? *1 = yes,* *2 = no* >> [CF17 + 1]	CF2 … CF17	CF17 + 1 Do any households collect forest products in this community? *1 = yes,* *2 = no* >> [NEXT MODULE]	CF17 + 2 Please list up to three forest products by order of importance. CODE PRODUCT		
			1st	2nd	3rd

MODULE CG: CHANGES
Insert between CG7 and CG8
CG7 + 1 availability of timber
CG7 + 2 availability of medicinal plants
CG7 + 3 availability of wild food products (e.g. fruits, mushrooms, beverages)
CG7 + 4 access to forest

MODULE CL: FILTER QUESTIONS (to be added)
Did anyone in this community harvest, process or sell forest products in the last 12 months?
1 = yes, 2 = no
If yes, PROCEED TO COMMUNITY ***FORESTRY*** MODULES.

Timber harvested in Nepal.

© B. KARNA

Annex E
Codebook[1]

1.1
Code relationship to head of household

Relationship to head of household	Code
head of household	1
spouse	2
son/daughter	3
son-in-law/daughter-in-law	4
grandson/granddaughter	5
father/mother	6
father-in-law/mother-in-law	7
brother/sister	8
brother-in-law/sister-in-law	9
uncle/aunt	10
niece/nephew	11
stepchild/adopted child	12
other family members	13
members not related to household head	14

1.2
Code household

Relationship to head of household	Code
only/mainly by wife and adult female household members	1
both adult males and adult females participate about equally	2
only/mainly by the husband and adult male household members	3
only/mainly by girls (<15 years)	4
only/mainly by boys (<15 years)	5
only/mainly by children (<15 years), and boys and girls participate about equally	6
all members of household participate equally	7
person employed by and living with the household	8
none of the above alternatives	9

[1] This Codebook has been adapted from CIFOR (2014) PEN Code List (http://www1.cifor.org/fileadmin/subsites/PEN/doc/PEN_Codes_Version_7.7_February_2014.pdf).

1.3
Code product

Product	Code
1. Harvested products from the wild (including forests) – in the raw	**1–100**
i. woody perennials and wood-based products	1–20
ii. non-woody plants and plant-based products	21–50
iii. animals and animal-based products	51–70
v. minerals and others	71–100
2. Processed products from the wild (including forests)	**101–200**
i. wood-based products	101–130
ii. non-wood-based products	131-200
3. Agricultural crops	**201–500**
cereals	201–220
roots and tubers	221–240
legumes	241–270
vegetables	271–310
fruits	311–350
beverages	351–360
spices	361–380
other food crops	381–400
non-food crops or non-food parts of crops	401–420
miscellaneous and unclassified	421–500

Product	Code	Scientific name	Comments
1. Harvested products from the wild (including forests) – in the raw	**(1–100)**		
i. Woody perennials and wood-based products	**(1–20)**		
timber	1		this includes trees cut for charcoal production
poles	2		
fuelwood/firewood	3		
tree barks	4		
tree leaves	5		
tree roots	6		
lianas and vines	7		
rattan	8		
bamboo	9		
frond	10		leaves of palms
tree branches	11		

Table 1.3 continues on next page

Table 1.3 continued

Product	Code	Scientific name	Comments
logs	12		can also be classified in the broader category of timber ("logs" often refer to short pieces of timber)
tree seedlings	13		
fence posts	14		
brooms	15		unprocessed
leaf for food	16		
leaf for medicinal purpose	17		
root for medicinal purpose	18		
bark for medicinal purpose	19		
ii. Non-woody plants and plant-based products	**(21–50)**		
wild fruits	21		
nuts	22		Brazil nuts have a separate code (45)
mushroom	23		
roots and tubers	24		tree roots are included above (code 6)
wild vegetables	25		
seeds	26		
medicinal plants	27		all (parts of) plants used for medicinal purposes should be put here, e.g. a tree root or mushroom used for medicinal purposes (do not use categories above)
ornamental/aesthetic/fashion	28		
latex and resin	29		note that latex and resin can also be tree-based; rubber has a separate code (46)
oils	30		
dyes	31		
non-animal manure	32		
fodder grass/livestock browse	33		
thatching grass	34		
other grasses	35		e.g. for basket making
reeds	36		
spices	37		
stalks	38		e.g. from millet
banana fibres	39		
banana leaves	40		
wild yam	41		NB: not tubers as "normal" yam (224)
wild coffee	42		

Table 1.3 continues on next page

Table 1.3 continued

Product	Code	Scientific name	Comments
wild coffee seedlings	43		
"cabbage palm"	44		heart of the palm during its development phase (Senegal, *Choux palmiste*)
brazil nut	45	*Bertholletia excelsa*	nuts in general are code 2
rubber	46	*Hevea brasiliensis*	latex from tree (latex in general is code 29)
iii. Animals and animal-based products	**(51–70)**		
game meat – mammals	51		
game meat – reptiles	52		
game meat – birds and bats	53		
game meat – insects and worms	54		
birds' nests	55		
fish	56		
animal skin	57		
animal-based medicine	58		as for medicinal plants, enter any animals or animal parts used for medicine here
honey	59		
game meat – amphibian	60		
animal manure	61		manure collected as an environmental resource
wild animals	62		general code
jerky	63		dried and salted meat
iv. Minerals and others	**(71–100)**		
gold	71		
diamonds	72		
quarry stones	73		
clay/mud	74		
slate	75		
sand	76		
tooth-cleaning twigs	77		
stones	78		
potash	79		
salt	80		

Table 1.3 continues on next page

Table 1.3 continued

Product	Code	Scientific name	Comments
2. Processed products from the wild (including forests)	**(101–200)**		
i. Wood-based products	**(101–130)**		
sawn wood	101		
charcoal	102		
wooden furniture	103		
other wooden tools/implements	104		e.g. spoons, bowls, hoe handles
woodcraft	105		e.g. figurines, cultural and symbolic artefacts
rattan furniture	106		
other rattan products	107		
bamboo furniture	108		
other bamboo products	109		
canoe	110		
drums	111		
other musical instruments	112		
walking sticks	113		
offcuts	114		residual from sawn wood production
rubber shoes	115		
shingles	116		
ii. Non-wood-based products	**(131–200)**		
woven products	131		mats, baskets, brooms, hats, etc.
juice and oils from forest products	132		e.g. soaps
alcoholic beverages	133		
pottery	134		
bricks	135		
roasted cashew	136		
fly swatter	137		made from palm branch
fishing trap/net	138		
catapult	139		
broom	140		
basket	141		
roof of house	142		
floor of house	143		
house	144		
storage shed	145		
veranda of house	146		

Table 1.3 continues on next page

Table 1.3 continued

Product	Code	Scientific name	Comments
wall of house	147		
clothes	148		
3. Agricultural crops	**(201–500)**		**Note: the following codes can also be used if product is collected from forests or other environments**
Cereals	**(201–220)**		
rice	201	*Oryza sativa*	See also 215
maize	202	*Zea mays*	
wheat	203	*Triticum* sp.	
barley	204	*Hordeum vulgare*	
millet	205	*Panicum miliaceum, Setaria italica, Pennisetum glaucum*	
sorghum	206	*Sorghum* sp.	
simsim	207		
teff	208		
buckwheat	209		
naked barley	210		
amaranthus	211	*Amaranthus* sp.	also used as green leafy vegetable
fresh maize	212		maize in general: 202
dry maize	213		maize in general: 202
oat	214	*Avena sativa*	
rice (lowland)	215	*Oryza sativa*	rice in general: 201
Roots and tubers	**(221–240)**		
cassava/manioc (fresh)	221	*Manihot esculenta*	
potato	222	*Solanum tuberosum*	also called Irish potato
sweet potato	223	*Ipomoea batatas*	
yam	224	*Dioscorea* sp.	
cocoyam/taro	225	*Colocasia* sp.	
cassava/manioc (dried)	226		cassava in general: 221
cassava/manioc (flour)	227		cassava in general: 221
angel's wing	228	*Xanthosoma lindenii*	
malanga	229	*Xanthosoma* spp.	
tapioca	230		starch derived from cassava (manioc)

Table 1.3 continues on next page

Table 1.3 continued

Product	Code	Scientific name	Comments
turmeric	231		
souchet	232		agricultural herb
Legumes	**(241–270)**		
soybean	241	*Glycine max*	
mung bean	242	*Cicer arietinum*	also chick pea
stink bean	243	*Parkia speciosa*	
pigeon pea	244	*Cajanus cajan*	
cow pea	245	*Vigna unguiculata*	
grams	246		green grams or mung bean
groundnut (peanut)	247	*Arachis hypogaea*	
bean (mustang)	248		
string bean	249		
red bean	250		
field beans (fresh)	251		
field beans (dried)	252		
sesame	253	*Sesamum indicum*	
beans	254	*Phaseolus vulgaris*	general code for beans
enkole	255		type of bean (Uganda)
legumes (general code)	256		
fava bean, broad bean	257	*Vicia faba*	
pueraria groundcover	258	*Pueraria* spp.	
bambara groundnut	259	*Vigna subterranea*	
peas	260	*Pisum sativum*	
leaves of green beans	261		
mung	262	*Vigna radiate*	
chick pea	263	*Cicer arietinum*	
guar bean/cluster bean	264	*Cyamopsis tetragonolobus*	
Vegetables	**(271–310)**		
cabbage	271	*Brassica oleracea*	
carrot	272	*Daucus carota*	
cauliflower	273	*Brassica oleracea*	
chilli	274	*Capsicum* sp.	

Table 1.3 continues on next page

Table 1.3 continued

Product	Code	Scientific name	Comments
cucumber	275	*Cucumis sativus*	augurk (Suriname)
eggplant	276	*Solanum melongena*	also called aubergine – see codes 295–296
garlic	277	*Allium sativum*	
ginger	278	*Zingiber officinale*	
lettuce	279	*Lactuca sativa*	
onion	280	*Allium cepa*	
paprika	281		
pepper	282	*Piper nigrum*	the plant; the spice is code 367
pumpkin	283	*Cucurbita* sp.	
spinach	284	*Spinacea oleracea*	
squash	285	*Cucurbita sp.*	
tomato	286	*Lycopersicon esculentus*	
radish	287	*Raphanus sativus*	
turnip	289	*Brassica rapa*	
gourd (bitter/spiny)	290	*Lagenaria vulgaris;* L. sciceraria	
tree tomato (tamarillo)	291	*Cyphomandra betacea*	
okra (lady's finger)	292	*Abelmoschus esculentus*	
callaloo	293		
bitter solum	294		
nakati	295	*Solanum aethiopicum*	other names: Ethiopian nightshade, mock tomato, Ethiopian eggplant
bitter eggplant	296	*Solanum macrocarpon*	also called African eggplant
sweet leaf	297	*Sauropus androgynus*	
luffa	298		
chayote	299		
water spinach	300	*Ipomoea aquatica*	
green onion	301	*Allium fistulosum*	
chicory	302	*Cichorium intybus*	
West Indian gherkin, burr cucumber	303	*Cucumis anguria*	

Table 1.3 continues on next page

Table 1.3 continued

Product	Code	Scientific name	Comments
collard greens	304	*Brassica oleracea*	
parsley	305	*Petroselinum crispum*	
arugula	306		
jambú	307		
eru	308	*Gnetum africanum*	*nfumbwa* in Democratic Republic of the Congo
unspecified vegetables	309		general code for rare vegetables
beet	310	*Beta vulgaris*	
Fruits	**(311–350)**		
avocado	311	*Persea americana*	
banana	312	*Musa* sp.	This includes all types, may use more detailed codes 345–349
carambola/star fruit	313	*Averrhoa carambola*	
coconut	314	*Cocos nucifera*	
durian	315	*Durio grandiflorus*	
guava	316	*Psidium guajava*	
jack fruit	317	*Artocarpus heterophyllus*	
lemon	318	*Citrus limon*	
lime	319	*Citrus* spp.	
lichee	320	*Litchi chinensis*	
mango	321	*Mangifera indica*	
mangosteen	322	*Garcinia mangostana*	
orange	323	*Citrus* spp.	
papaya	324	*Carica papaya*	
passion fruit	325	*Pasiflora* spp.	
pineapple	326	*Ananas comosus*	
plantain	327	*Musa paradisiaca*	
rambutan	328	*Nephelium lappaceum*	
soursop (sirsak)	329	*Annona muricata*	
watermelon	330	*Citrullus lanatus*	

Table 1.3 continues on next page

Table 1.3 continued

Product	Code	Scientific name	Comments
apple	331	*Malus domestica*	
peach	332	*Pirus communis*	
plum	333	*Prunus* spp.	
apricot	334	*Prunus armeniaca*	
cantelope	335	*Cucumis melo*	
almond	336	*Prunus* spp.	
pond-apple	337	*Annona glabra*	also known as monkey-apple
custard-apple	338	*Annona cherimola*	
Rollinia deliciosa			
grapefruit	339	*Citrus paradisi*	
cashew fruit	340	*Anacardium spruceanum*	also wild
cashew seed/nut	341	*Anacardium spruceanum*	
craboo	342		
banana – cooking (plantain)	343		
banana – brewing	344		
banana – roasting	345		
banana – sweet (small)	346		
banana -–sweet (large)	347		bogoya in Uganda
tangerine	348	*Citrus reticulata*	
Beverages	**(351–360)**		not including fruit juices
cocoa	351	*Theobroma cacao*	also wild
coffee	352	*Coffea arabica; Coffea robusta*	
tea	353	*Camellia sinensis*	
fresh coffee	354		
dry coffee	355		
cocoa seeds	356	*Theobroma cacao*	
Spices	**(361–380)**		
cardamom	361	*Elettaria cardamomum*	
cinnamon	362	*Cinnamomum zeylanicum*	
clove	363	*Eugenia caryophyllata*	

Table 1.3 continues on next page

Table 1.3 continued

Product	Code	Scientific name	Comments
curry	364	*Murraya koenigii*	
turmeric	365	*Curcuma longa*	
mint	366	*Monardella* spp.	
pepper	367	*Piper nigrum*	the spice; the plant is code 282
vanilla	368	*Vanilla planifolia*	
zanthoxylum	369		
red pepper	370	*Capsicum* spp.	
coriander	371	*Coriandrum sativum*	also called *cilantro*
oregano	372	*Origanum vulgare*	
lemongrass	373		also called *citronella*
Other food crops	**(381–400)**		
palm oil	381	*Elaeis guineensis*	
sugar cane (and juice)	382	*Saccharum officinarum*	
sunflower	383	*Helianthus annus*	
mustard	384	*Sinapis alba*	
Brassica nigra			
sweets made from cultivated fruits	385		
aloe vera	386	*Aloe vera*	
unrefined sugar	387		
	388	*liquor*	beverage
Non-food crops or non-food parts of crops	**(401–420)**		
cotton	401	*Gossypium* spp.	
jute	402	*Corchorus capsularis*	
sisal	403	*Agave sisalana*	
rubber	404	*Hevea brasiliensis*	
tobacco	405	*Nicotiana tabacum*	
coca leaves	406	*Erythroxylum coca*	
eucalyptus	407	*Eucalyptus* spp.	
palm stem (or heart?)	408		
palm petiole	409		

Table 1.3 continues on next page

Table 1.3 continued

Product	Code	Scientific name	Comments
roselle flowers	410	*Hibiscus sabdariffae*	popular food in Maranhão, Brazil
roselle leaves	411		
millet stem	412		
acacia species	413	*Acacia* spp.	
pine species	414	*Pinus* spp.	
mahogany	415	*Swietenia mahagoni; Swietenia macrophylla*	
musizi	416		*Maesopsiseminii*, a fast-growing indigenous tree species (Uganda)
Spanish/Mexican cedar	417	*Cedrela odorata*	
brazil nut tree	418	*Bertholletia excelsa*	
cannabis	419		
atimezia	420		medicinal plant (Uganda)
Miscellaneous and unclassified	**(421–500)**		
grass for domestic animals	421		
legumes for domestic animals	422		
leaves of cultivated crops	423		banana leaves have a separate code (40)
crop residues	424		
brachiaria grass	425	*Brachiaria* spp.	
elephant grass, Napier grass or Uganda grass	426	*Pennisetum purpureum*	
kikuyo grass	427	*Pennisetum clandestinum*	
kudzu	428	*Pueraria montana*	green manure
n.a.	429	*Stizolobium terrarium*	green manure
Guinea grass, Tanganyika grass, buffalo grass	430	*Panicum maximum*	
thatching grass	431	*Hyparrhenia rufa*	
bluestem grass	432	*Andropogon gayanus*	

1.4
Code origin

Origin	Code
old-growth natural forest	1
secondary/regenerating natural forest	2
managed plantation forest	3
non-forest tree-based wild including savannah, *miombo*, fallow	4
non-forest tree based cultivated system, including trees on farms, woodlots, agroforestry	5
non-forest natural system, including rangelands, grasslands and scrublands	6

1.5
Code programme

Programme	Code
payments other than wage or business related to ecotourism	1
carbon sequestration/REDD+ scheme	2
watershed protection scheme	3
biodiversity conservation programme	4
payment for use of forest (e.g. from timber or mining companies)	5
other, specify:	99
don't know	9

1.6
Code transport

Transport	Code
walking	1
boat	2
car/lorry	3
bike	4
other, specify:	99

1.7
Code tenure

Tenure	Code
communal	1
private	2
state-owned	3

1.8
Code source

Source	Code
old-growth primary/natural forest	1
secondary or regenerating forest	2
managed plantation forest	3
non-forest tree-based wild systems (savannahs, fallows)	4
non-forest tree-based cultivated systems (trees on farms, woodlots, agroforestry)	5
non-forest natural systems with natural vegetation (grassland, scrubland, rangelands, mosaic landscapes)	6
purchased by household	7
donated/given by relatives or other	8
other, specify:	99

1.9
Code change

Change	Code
agriculture expansion/reduction	1
expansion/reduction resulting from livestock	2
climate change/natural disasters	3
rural-to-urban migration	4
wars/conflicts	5
urban-to-rural migration	6
change in land tenures	7
small-scale timber extraction	8
large-scale timber extraction	9
forest protection projects/legislation	10
infrastructure development (e.g. road, electricity)	11
economic crisis	12
ecotourism development	13
new or revised forest legislation	14
other, specify:	99

1.10
Code purpose

Purpose	Code
fuelwood for domestic use	1
fuelwood for sale	2
fodder for own use	3

Table 1.10 continues on next page

Table 1.10 continued

Purpose	Code
fodder for sale	4
timber/poles for own use	5
timber/poles for sale	6
medicinal purposes (e.g. neem)	7
food purposes (e.g. fruit)	8
other domestic uses	9
other products for sale	10
carbon sequestration	11
other environmental services	12
for shading of agriculture	13
reducing soil erosion	14
aesthetic reasons	15
land demarcation	16
to increase the value of land	17
to allow children/grandchildren to see these trees	18
to improve soil fertility	19
to improve crop yields	20
other, specify:	99

1.11
Code period unit

Period unit	Code
hour	1
day	2
week	3
month	4
year	5
unit, specify:	6
other, specify:	99

1.12
Code occupation

Occupation	Code
forestry – logging	1
forestry – processing (e.g. charcoal, sawn wood)	2
forestry – transport	3
forestry-other	4

Table 1.12 continues on next page

Table 1.12 continued

Occupation	Code
NTFP – harvesting	5
NTFP – processing	6
NTFP – transport	7
NTFP – marketing/management	8
forest guard/ranger	9
forest guide/tourism	10
PES-related	11
handicraft manufacture	12
carpentry	13
other, specify:	99

1.13
Code business

Business	Code
trade of forest product	1
handicraft manufacturing	2
carpentry	3
timber processing	4
logging	5
other forest-based (e.g. NTFP collection)	6
other business organizing/skilled labour in forest-related activity (e.g. ranger service)	7
transport of forest product (e.g. car, boat)	8
ecotourism related (e.g. guiding service, eco-guesthouse)	9
herbalist/traditional healer	10
contracted work for forest product/service management	11
renting out equipment for forest product/service management	12
other, specify:	99

1.14
Additional codes

Standard community questionnaire			
COM_Module A Seasonal calendar	COM_Module Seasonal calendar	Question 1	*1 = main harvest* *2 = sale* *3 = harvest and sale period are the same*
COM_Module B Most important forest and wild products (MIPs)	COM_Module B Most important forest and wild products	Question 1	code product
		Question 2	code origin
		Question 3	code tenure
		Question 4 Access	*1 = very easy* *2 = somewhat easy* *3 = neither difficult nor easy* *4 = somewhat difficult* *5 = very difficult*
		Questions 5 and 6 Primary collector/ buyer	*1 = subsistence-oriented users in the village* *2 = small-scale commercial users in the village* *3 = large-scale commercial users in the village* *4 = subsistence-oriented users from outside the village* *5 = small-scale commercial users from outside the village* *6 = large-scale commercial users from outside the village* *99 = other, specify:*
		Question 7 Availability	*0 = no change* *1 = increased* *2 = decreased*
		Question 8 Code reason (decrease)	*1 = increased collection of MIPs for sale* *2 = reduced forest area due to small-scale clearing* *3 = reduced forest area due to large-scale clearing* *4 = increased demand for MIPs from local people for own use* *5 = increased demand for MIPs due to more collection from outsiders for own use* *6 = reduced forest access by central or state government (e.g. for forest conservation)* *7 = reduced forest access due to people from outside buying land* *8 = restrictions on MIP/forest use by government rules* *9 = local restrictions on MIP/forest use (e.g. use by internal or community rules)* *10 = climate change (e.g. drought and less rainfall)* *11 = plants difficult to grow or cultivate)* *99 = other, specify:*

Table 1.14 continues on next page

Table 1.14 continued

Standard community questionnaire			
		Question 9 Code reason (increase)	*1 = more availability of MIPs due to better forest management* *2 = less demand for MIPs for sale* *3 = fewer local (village) people collecting for own use* *4 = fewer outsiders (subsistence users) collecting for own use* *5 = fewer outsiders (commercial users) collecting/ using* *6 = improved access rights to product* *7 = exploitation of new forest areas* *8 = forest clearing that increases supply of product (e.g. fuelwood)* *9 = climate change, (e.g. changes in rainfall)* *10 = plants easy to grow or cultivate* *99 = other, specify:*
COM_Module D Community benefits from forest-related land use or management programmes	COM_Module D1 Practice	Question 1 Participation in programme related to [practice]	*1 = yes* *2 = no*
		Question 2 Main objectives of programme requiring practices	*1 = ecotourism/landscape beauty* *2 = carbon sequestration/REDD+* *3 = watershed protection* *4 = biodiversity conservation* *5 = payment for use of forest (e.g. from timber or mining companies)* *99 = other, specify:*
		Question 3 Participation in past 12 months	*1 = yes* *2 = no*
		Question 4 Cash or other benefits	*0 = no* *1 = yes, cash payments to households* *2 = yes, other benefits to households (specify:)* *3 = yes, cash payment to the village as a whole* *4 = yes, other benefits to the village as a whole (for example, a community development project, school classroom, health clinic, or other service)* *5 = yes, both to household and village*
		Question 6 Who implemented	*1 = government/public office* *2 = international funding agency* *3 = NGO* *99 = other group, specify:*
	COM_Module D2 Support	Question 7 Received external support	*1 = yes* *2 = no*
		Question 8 Support continuing	*1= yes* *2= no*

Table 1.14 continues on next page

Table 1.14 continued

Standard community questionnaire			
		Question 9 Who provided support	*1 = government/public office* *2 = international funding agency* *3 = NGO* *99 = other group, specify:*

Extended community questionnaire			
COM_Module E Governance	COM_Module E1 Forest institutions	Question 1.1 Are there any rules?	*0 = none/very few* *1 = yes, but vague/unclear* *2 = yes, clear rules exist* *3 = don't know*
		Question 1.2 Who makes the rules?	*1 = village head* *2 = community forest associations/customary institutions* *3 = forest officer (government forest departments)* *4 = other government department/regulations (Name:)* *5 = private landowners* *6 = private company (Name:)* *99 = other, specify:*
		Question 1.3 Kinds of activities	*1 = time of extraction/harvest of MIPs from forest* *2 = amount of MIPs harvested* *3 = who is eligible to harvest MIPs* *4 = where in the forest MIPs can be harvested* *99 = other, specify:*
		Question 1.4 Rules respected	*0 = no/very little* *1 = to a certain extent by some groups of villagers* *2 = to a certain extent by everyone* *3 = yes, but only by some groups of villagers* *4 = yes, by everyone*
		Question 1.5 What are the rules?	*1 = rules are established by law or formal regulations (de jure)* *2 = informal rules in use that are typically followed by the community, even if not established by law or formal regulations (de facto)* *3 = both* *99 = other, specify:*
		Question 1.6 Permission	*0 = no* *1 = yes, users have to inform the authorities* *2 = yes, written permission needed*
		Question 1.7 Pay for permission	*1 = yes* *2 = no*
		Question 1.8 Who issues permit?	*1 = village head* *2 = community forest associations/customary institutions* *3 = forest officer (forest departments)* *4 = other government official* *99 = other, specify:*

Table 1.14 continues on next page

Table 1.14 continued

Extended community questionnaire			
		Question 1.9 Sustainable management	*1 = yes* *2 = no*
		Question 1.10 Correct authority	*1 = yes* *2 = no*
	COM_Module E2 Enforcement and penalties	Question 2.1 Who enforces formal rules?	*1 = village head* *2 = community forest associations/customary institutions* *3 = forest officer (government forest departments)* *4 = other government department/regulations (Name:)* *5 = private landowners* *6 = private company (Name:)* *99 = other, specify:*
		Question 2.2 Penalties for violation of formal rules	*1 = yes* *2 = no*
		Question 2.3 Type of penalty	*1 = fee (cash payment)* *2 = returning collected products* *3 = labour (extra work)* *4 = warning* *5 = temporary exclusion from resource use* *6 = permanent exclusion from resource use* *99 = other, specify:*
		Question 2.4 Who enforces informal rules in use?	*1 = village head* *2 = community forest associations/customary institutions* *3 = forest officer (forest departments)* *4 = other government department/regulations* *5 = private landowners, companies* *99 = other, specify:*
		Question 2.5 Penalties for informal rules	*1 = yes* *2 = no*
		Question 2.6 Type of penalty	*1 = fee (cash payment)* *2 = returning collected products* *3 = labour (extra work)* *4 = take away user rights* *5 = warning* *6 = exclusion from resource use* *99 = other, specify:*
COM_Module F Community environmental services	COM_Module F1 Perceptions of climate change	Question 3 Steps to combat climate change	*1 = yes* *2 = no*

Table 1.14 continues on next page

Table 1.14 continued

Extended community questionnaire			
		Question 5 How helpful actions are to overcome climate change effects	*1 = very helpful* *2 = somewhat helpful* *3 = no difference at all* *4 = somewhat unhelpful (works somewhat against our objectives)* *5 = very unhelpful (has an opposite or negative effect from what we intended)*
		Question 6 Helpful after five years	*1 = very helpful* *2 = somewhat helpful* *3 = no difference at all* *4 = somewhat unhelpful (works somewhat against our objectives)* *5 = very unhelpful (has an opposite or negative effect from what we intended)*

Standard household questionnaire			
H_Module A Income	HH_Module A1 Income from forest and wild products	Question 1.1 Collected forest or wild products	*1 = yes* *2 = no*
		Question 1.2 Primary collector	HOUSEHOLD MEMBER – INDIVIDUAL ID given to the household in the BASIC IDENTIFICATION section of the LSMS survey, or in the BASIC INFORMATION OF HOUSEHOLD MEMBERS (ANNEX C1 in sourcebook)
		Question 1.4 Where	code origin
		Question 1.16 Primary processer	HOUSEHOLD MEMBER – INDIVIDUAL ID given to the household in the BASIC IDENTIFICATION section of the LSMS survey, or in the BASIC INFORMATION OF HOUSEHOLD MEMBERS (ANNEX C1 in sourcebook)
	HH_Module A2 Other forest-related income sources including PES programmes	Question 2.1 Other income earned	*1 = yes* *2 = no*
		Question 2.2 Payments received	*1 = yes* *2 = no*
		Question 2.3 Programmes to receive payment	code programme
		Question 2.6 Receive contract	*1 = yes* *2 = no*

Table 1.14 continues on next page

Table 1.14 continued

Standard household questionnaire			
		Question 2.10 In-kind benefits	*1 = household consumption related (incl. food, clothing, fees)* *2 = household wealth related (incl. assets)* *3 = village-level benefits* *4 = other, specify:* *5 = none*
		Question 2.12 Payer	*1 = NGO/civil society* *2 = government* *3 = municipality* *4 = private sector* *99 = other, specify:*
		Question 2.13 Activity	*1 = yes, stopped* *2 = no, still doing* *3 = yes, reduced* *4 = n.a. (wasn't doing [ACTIVITY])*
HH_Module B Forest resources – energy health and construction	HH_Module B1 Forest resource base	Question 1.1b	*1 = walking* *2 = boat* *3 = car/lorry* *4 = bike* *99 = other, specify:*
	HH_Module B2 Forest and energy – fuelwood and charcoal	Question 2.1 Anyone used	*1 = yes* *2 = no*
		Question 2.2 For cooking	*0 = not used at all* *1 = very little* *2 = about half of the time* *3 = mostly* *4 = always* *9 = don't know*
		Question 2.3 For water sterilization	*0 = not used at all* *1 = very little* *2 = about half of the time* *3 = mostly* *4 = always* *9 = don't know*
		Question 2.4 For heating	*0 = not used at all* *1 = very little* *2 = about half of the time* *3 = mostly* *4 = always* *9 = don't know*
		Question 2.5 For lighting	*0 = not used at all* *1 = very little* *2 = about half of the time* *3 = mostly* *4 = always* *9 = don't know*
		Question 2.6 Purchase	*1 = yes* *2 = no*

Table 1.14 continues on next page

Table 1.14 continued

Standard household questionnaire			
		Question 2.7 How much purchased	*1 = very little* *2 = about half* *3 = most* *4 = all* *9 = don't know*
		Question 2.8 Tenure	code tenure
		Question 2.9 Ease of access	*1 = very easy* *2 = somewhat easy* *3 = neither difficult nor easy* *4 = somewhat difficult* *5 = very difficult*
	HH_Module B3 Forests and health	Question 3.1 Household used medicinal plants	*1 = yes* *2 = no*
		Question 3.2 Obtain plants	*1 = collect them ourselves* *2 = purchase them at a market or local seller* *3 = visit a traditional healer to get treatment*
		Question 3.3 Tenure	code tenure
		Question 3.4 Ease of access	*1 = very easy* *2 = somewhat easy* *3 = neither difficult nor easy* *4 = somewhat difficult* *5 = very difficult*
		Question 3.5 Time spent on collection compared with five years ago	*1 = more* *2 = about the same* *3 = less*
		Question 3.6 Availability	*0 = no change* *1 =increased* *2 = decreased*
		Question 3.7 Response to lack of medicinal plants	*1 = increased collection time (e.g. farther away from home)* *2 = found alternative plants for cure* *3 = purchased other drugs/medicines* *4 = taken preventive measures (e.g. do more exercises)* *5 = cultivated medicinal plants* *6 = did nothing* *99 = other, specify:*
		Question 3.8 Preference	*0 = no preference* *1 = medicinal plants* *2 = modern medicine*

Table 1.14 continues on next page

Table 1.14 continued

Standard household questionnaire			
	HH_Module B4 Forests and construction	Question 4.1 Use for construction	*1 = yes* *2 = no*
		Question 4.2 Main products used	code product
		Question 4.3 Reliance on product	*0 = not used at all* *1 = very little* *2 = about half of the time* *3 = mostly* *4 = always* *9 = don't know*
		Question 4.4 Tenure	code tenure
		Question 4.5 Ease of access	*1 = very easy* *2 = somewhat easy* *3 = neither difficult nor easy* *4 = somewhat difficult* *5 = very difficult*
HH_Module C Food shortage and crises	HH_Module C1 Food shortage	Question 1.1 Food shortage experienced	*1 = yes* *2 = no*
		Question 1.3 Use forest or wild products to meet food needs	*1 = yes* *2 = no*
		Question 1.4 Importance of wild and forest products	*1 = very important, we rely primarily on forest products to overcome food shortage* *2 = somewhat important, but we also rely on other resources to overcome food shortage* *3 = no more or less important than other resources we rely on to overcome food shortage* *4 = somewhat unimportant (we generally rely on other resources to overcome food shortage)* *5 = very unimportant (we only rely on forest products when no other options are available)*
		Question 1.5 Products used to meet food shortage	code product
		Question 1.6 Obtained by	*1 = bought* *2 = collected* *3 = charity/donation* *4 = combination of the above*
		Question 1.7 What was done with products	*1 = consumed all* *2 = consumed and sold for income* *3 = sold all*

Table 1.14 continues on next page

Table 1.14 continued

Standard household questionnaire			
	HH_Module C2 Shocks and crises	Question 2.1 Household affected by shock	*1 = yes* *2 = no*
		Question 2.2 Rank severity	*1 = most severe* *2 = second most severe* *3 = third most severe*
		Question 2.3 Collect or use forest products to recover	*1 = yes* *2 = no*
		Question 2.4 Products used or collected	code product
		Question 2.5 What was done with products?	*1 = sell* *2 = consume* *3 = sell and consume*
		Question 2.6 Source	code source
		Question 2.7 Effectiveness of product in recovery	*0 = not important at all* *1 = a little bit important* *2 = somewhat important* *3 = equally important with other steps my household took to recover* *4 = more important than others* *5 = most important for helping my household to recover*

Extended household questionnaire			
HH_Module D Forest changes and clearance	HH_Module D1 Forest changes	Question 1.1 Change in forest cover in last five years	*0 = no change* *1 = increased* *2 = decreased*
		Question 1.2 Main reason for change	code change

Table 1.14 continues on next page

Table 1.14 continued

Extended household questionnaire			
	HH_Module D2 Forest clearance	Question 2.1 Forest clearance by household in last five years	*1 = yes* *2 = no*
		Question 2.3 Forest clearance communally in last five years	*1 = yes* *2 = no*
		Question 2.6 Planted trees	*1 = yes* *2 = no*
		Question 2.8 Purpose of planting	*1 = fuelwood for domestic use* *2 = fuelwood for sale* *3 = fodder for own use* *4 = fodder for sale* *5 = timber/poles for own use* *6 = timber/poles for sale* *7 = medicinal purposes (e.g. neem)* *8 = food purposes (e.g. fruit)* *9 = other domestic uses* *10 = other products for sale* *11 = carbon sequestration* *12 = other environmental services* *13 = for shading of agriculture* *14 = reducing soil erosion* *15 = aesthetic reasons* *16 = land demarcation* *17 = to increase the value of land* *18 = to allow children/grandchildren to see these trees* *19 = to improve soil fertility* *20 = to improve crop yields* *99 = other, specify:*
		Question 2.9 Forest cleared in past 12 months	*1 = yes* *2 = no*
		Question 2.11 Purpose of forest cleared in past 12 months	*1 = cropping* *2 = tree plantation* *3 = pasture* *4 = non-agricultural uses* *5 = timber extraction* *6 = charcoaling* *99 = other, specify:*
		Question 2.12 Principal crops grown	code product

Table 1.14 continues on next page

Table 1.14 continued

Extended household questionnaire			
		Question 2.13 Type of forest cleared	code origin
		Question 2.15 Tenure	code tenure
		Question 2.16 Ease of access	*1 = very easy* *2 = somewhat easy* *3 = neither difficult nor easy* *4 = somewhat difficult* *5 = very difficult*

Alternative modules			
EXT_Module	EXT_Module A3 Wage income	Question 3.1 Wage work done	*1 = yes* *2 = no*
		Question 3.3 Type of work	code occupation
		Question 3.4 Payment per period	code period unit
	EXT_Module A4 Business income	Question 4.1 Business owned	*1 = yes* *2 = no*
		Question 4.2 Type of business	code business
EXT_Module	EXT_Module A5 Forest-related assets	Question 5.1 Own assets	*1 = yes* *2 = no*
		Question 5.2 Currently owned assets	*1 = yes* *2 = no*
		Question 5.6 Frequency of use	*1 = very rarely, only once or twice per year* *2 = not often, but at least several times per year* *3 = at least once or twice per month* *4 = often, several times per month* *5 = very often, several times per week*

Listing most important forest products during a focus group discussion (United Republic of Tanzania).

© L. PERSHA

Annex F
Data sources and links

Agricultural household adaptation to climate change

- Land management and investment options: http://siteresources.worldbank.org/INTSURAGRI/Resources/7420178-1294259038276/Adaptation_to_Climate_Change_Land_Management.pdf
- Water stress and variability: http://siteresources.worldbank.org/INTSURAGRI/Resources/7420178-1294259038276/Adaptation_to_Climate_Change_Water_Stress.pdf

Brazil Forest Service

- Socioeconomic survey: http://ifn.florestal.gov.br/images/stories/Link_Documentos/formulario%20f14_levantamento%20socio%20ambiental.pdf

CIFOR PEN resources

- PEN prototype questionnaire: http://www.cifor.org/pen/research-tools/the-pen-prototype-questionnaire.html
- PEN technical guidelines: http://www.cifor.org/pen/research-tools/the-pen-technical-guidelines.html

Criteria and indicators for sustainable forest management:

- Global Forest Resources Assessment: http://www.fao.org/forestry/fra/fra2015/en/
- Forests Europe: http://www.foresteurope.org/documentos/State_of_Europes_Forests_2011_Report_Revised_November_2011.pdf
- International Tropical Timber Organization (ITTO) criteria and indicators: http://www.itto.int/feature04/
- Montréal Process: http://www.montrealprocess.org/

LSMS Malawi

- Household questionnaire: http://siteresources.worldbank.org/INTSURAGRI/Resources/7420178-1294154327242/IHS3.Household.Qx.FINAL.pdf
- Community questionnaire: http://siteresources.worldbank.org/INTSURAGRI/Resources/7420178-1294154345427/NPS_Community_Qx_Y3_Final_English.pdf
- Agricultural questionnaire: http://siteresources.worldbank.org/INTSURAGRI/Resources/7420178-1294154327242/IHS3.Agriculture.Questionnaire.FINAL.pdf

LSMS United Republic of Tanzania

- Household questionnaire: http://siteresources.worldbank.org/INTSURAGRI/Resources/7420178-1294154345427/NPS_Household_Qx_Y3_Final_English.pdf
- Community questionnaire: http://siteresources.worldbank.org/INTSURAGRI/Resources/7420178-1294154345427/NPS_Community_Qx_Y3_Final_English.pdf
- Agricultural questionnaire: http://siteresources.worldbank.org/INTSURAGRI/Resources/7420178-1294154345427/NPS_Agriculture_Qx_Y3_Final_English.pdf

PROFOR resources

- Poverty forests linkages toolkit: http://www.profor.info/node/3

Survey implementation resources

- Angelsen *et al.*, 2011. *Measuring livelihoods and environmental dependence: Methods for research and fieldwork:* http://www.cifor.org/publications/pdf_files/Books/BAngelsen1102.pdf

Household interview in Mchakama village (United Republic of Tanzania).

© L. PERSHA

Annex G
Main results of field tests

1. Field-testing the forestry modules in Indonesia

This section summarizes the background, methods and key findings from the CIFOR-led field-testing (Bong *et al.*, 2016) and assessment of the forestry modules designed in collaboration with the FAO, CIFOR, IFRI and the World Bank LSMS and PROFOR programmes. The forestry modules were designed for up-scaled uses, *inter alia* in conjunction with the World Bank LSMS surveys, or as a basic stand-alone survey – to measure the contribution of forests and wild products to the household economy, as well as a number of other factors affecting household welfare. We tested three distinct forestry modules: (1) the standard HH_Questionnaire (quantitative, designed to be implemented as stand-alone surveys, collecting information on forests and wild products and their contribution to household welfare, although not accounting for non-forest income sources); (2) the standard COM_Questionnaire (i.e. key informant interviews – KIIs, and focus group discussions – FGDs, to provide the necessary supporting contextual information on the site and local use of the most important products); (3) the extended questionnaires (detailed questions about forest cover changes and clearance, participation in environmental service programmes and climate change adaptation, and forest-related institutions).

In February 2015 these forestry modules were field-tested as stand-alone surveys in the Kalis subdistrict of Kapuas Hulu district, West Kalimantan province, Indonesia (also known as the "heart of Borneo"). Thirty households were randomly selected from each of the four purposely-selected villages (i.e. total of 120 households), to test the survey under a range of conditions along a development, forest-use and accessibility gradient on the Mandai River. The furthest upstream village had high levels of natural forest cover, traditional swidden agricultural systems and poor accessibility; while the furthest downstream village had little natural forest, predominantly cultivated landscapes (including smallholder rubber plantations), and was relatively easy to access (being in close proximity to the district capital).

Four experienced local enumerators were intensively trained in the specifics of the forestry modules before translating the surveys. Then, when conducting the household surveys, the enumerators used a five-level Likert Scale to systematically record their observations and impressions of the individual survey questions. The results were analysed to quantitatively evaluate the structure and flow of the interview, the time taken to complete individual survey modules (and total interview length), and to identify questions that were problematic for the enumerators to deliver, or for the respondents

to understand. General observations and timing of the COM_Modules and the KIIs were also recorded. The main findings and recommendations are provided below.

In terms of survey timing, the household questionnaires took an average of 1 hour 50 minutes, while the community questionnaires took an average of 70 minutes, and the KIIs took 9–23 minutes. The time spent on the community questionnaires and the KIIs was considered reasonable; however it was suggested that the time taken to conduct the household surveys needed to be significantly reduced. The problematic and time-consuming questions in the household survey were identified using an analysis of the enumerator's observational data, and based on this a number of recommendations were made to improve their speed, clarity and efficiency.

Most questions were readily understood, though some of the questions involving complex concepts such as "environmental services" and "climate change" were difficult and time-consuming to deliver. Such concepts and related terms were new for the majority of the respondents, and even after careful explanation, comprehension was still lacking. It was suggested to avoid the use of such confusing concepts, and to disaggregate questions in a way that can be later aggregated to address the questions at hand.

In addition, many suggestions for technical changes and edits for the survey were provided, to improve the clarity, logic and flow. This included changes to table structures, the order of modules and question sequence; improved definitions; and improvements to coding. For example, it was suggested that for questions relating to potentially sensitive topics, such as illegal timber harvesting, it may be better to reorganize the product list starting with a less "sensitive" product, such as forest vegetables/fruits, instead of timber. Likewise for the list of assets, it was suggested not to start the asset list with contentious assets such as chainsaws and rifles.

The household survey that was tested had leading/screening "yes/no" questions at the beginning of many sections, and it was suggested to remove them to avoid whole sections being skipped over by flippant "yes" or "no" answers, which as we found were often made by respondents without their fully understanding the question (after some "digging" by the enumerators, in many cases their initial answer was changed). For the community questionnaires the suggestion was made to rearrange the order in which they are conducted, so that the seasonal calendar (Module B) is done first, followed by Module A (MIPs) to improve the flow. We also suggested considering gender-segregated FGDs, to avoid gender bias and to get more balanced responses. For the KIIs, it was suggested to have more than one informant in each village (i.e. not just the village leader), in order to avoid fatigue, particularly when the village leader was also selected as a respondent for the household survey. Furthermore, it was suggested that COM_Module C (units and pricing) would be better done as an FGD rather than a KII in order to obtain more accurate information.

These suggestions and recommendations were used to revise the forestry modules before the new version was then again tested in the United Republic of Tanzania.

Contributed by Nicholas Hogarth and Sven Wunder

2. Field-testing the forestry modules in the United Republic of Tanzania

Study site

The Tanzanian field test was conducted in five villages and 188 households in Kilwa and Lushoto districts, which represent several of United Republic of Tanzania's forest contexts: mangrove, coastal forest and lowland *miombo* woodland areas; and upland and montane forested areas. People in these villages are engaged at varying levels across a range of forest management activities, including community-based forest management, PES programmes, co-management with government, and the more traditional government forest reserve system that is found throughout much of United Republic of Tanzania. In terms of livelihoods, people had varying levels of involvement in timber or wood-based harvesting schemes, PES programmes, and related extractive and non-extractive forest-based activities.

Community focus group discussions (FGDs) were held on the first day of each village visit, with 10–15 village participants. The focus groups consisted of men and women, and included members of the village government, representatives of natural resource or environment committees, traditional healers, members of organized forest user groups where present, and others who are knowledgeable about forest resources and institutions in the village. The household survey was implemented in 40 households per village using a randomized strategy. Enumerators surveyed every third or fourth household encountered, moving along a transect from the centre of each village towards forested areas. This strategy was sufficient to generate a range of poorer and wealthier households in each village, and capture different forest use patterns among households living closer and further from the forest edge. Households comprised solely of elderly inhabitants or elderly inhabitants plus small children were not surveyed, as they are least likely to be engaged in forest activities.

The implementing team experimented with how to improve the instruments as the field test proceeded. Alterations included changing question wording, question order, response categories, etc.; and adding questions, or modifying the text to explain new sections. The instruments were substantially revised after the test in Kilwa district and modified instruments were used in the two villages in Lushoto district.

Key observations

Community surveys: The most difficult sections were those on community benefits from forest and land management-related programmes, and on environmental services. It can be confusing to conduct the community instrument where there are multiple kinds of forest type accessed and used by the villagers, or where there are forests under different management and/or used differently by the same village. The environmental services module is the most difficult for the facilitators to implement, and also seemed to yield the least reliable information. Sector-specific expertise is indispensable to implement and facilitate it well. The average time to implement the full community instrument was 2 hours 28 minutes.

Household surveys: One of the main challenges encountered by enumerators was collecting income and use information for illegal forest activities, such as charcoaling

and engaging in timber or other extractive forest-based activities for money. Given that many of the income contributions that households obtain from forests in United Republic of Tanzania are through activities that are not necessarily legal, even if widespread, obtaining accurate information for the income table depends on a good rapport between enumerator and respondent. The most difficult sections of the household survey were wage income, other forestry-related income, shocks and crises, climate change and variability, on adaptation strategies and PES. The average time to implement the full household instrument was 88 minutes.

Important lessons learned

The Tanzanian field test and field enumerators benefited from additional training and expertise around forestry issues provided to enumerators by a representative from the national forest agency at the start of the field test. This training was very valuable in helping the LSMS enumerators get up to speed on a range of technical forestry issues covered by the survey. Given the content covered by the instruments, it is highly useful for LSMS implementing agencies to consider partnering with representatives of national forestry agencies to conduct similar, and even more extensive, training for key staff; for example, on technical terms and broad background on forestry issues, including forest rules and regulations that are broadly applicable in the village context and likely to be encountered. Such training allows facilitators and enumerators to gain sufficient sectoral knowledge to effectively probe and engage with villagers on issues discussed in both instruments.

The entire survey should be viewed as standard, rather than viewing some modules as optional.[1] This is not only because it is likely to be confusing for the implementing agency to train supervisors and enumerators on when to use the various modules, but also because much of the data collected in the "optional" modules[2] are likely to be essential for interpreting the information in the standard modules. Collection of all the information contained in the instruments would therefore be ideal.

Adding an open-ended discussion section at the beginning of the FGD, to discuss the general background on forests and forest issues in the area, was found to be useful. It was also useful to add a structured table to the instrument that records information relating to: (1) the different kinds of forests that are being used by the village; (2) their names, area, management status, year established, tenure status; (3) which groups are involved in management, and what are the different rules and regulations that they are using or which apply. This also enabled the FGD facilitators to engage in the FGD much more effectively.

The field test showed that the following three sections either provided redundant information duplicated in other tables, gave seemingly unreliable information, or required strong sectoral expertise on the part of enumerators and were challenging to implement:

- *Section on forests and construction.* No new information was collected here that had not already been provided in HH_Module A.

[1] This refers to the extended modules.

[2] As above.

- *Section on forest changes*. The information provided for this table was highly inconsistent across households within the same village, and could be collected more effectively as part of the community focus group, so that a consensus can be reached on whether forest has increased or decreased, and the reasons discussed.
- *Section on environmental services.* To increase the reliability of information obtained from this section, it could be restricted to the community instrument only, where consensus can be reached through community discussion, due to the concepts being questioned and the underlying logic that the table is trying to achieve.

Contributed by Lauren Persha

3. Field-testing the forestry modules in Nepal

Study site

Field-testing the forestry modules was carried out from 10 September to 10 October in Parbat district, which is located in the midwestern hills of the Western Development Region of Nepal. Parbat lies between 28°00'19" and 28°23'59" north latitude and 83°33'40" to 83°49'30" east longitude. The topography ranges from a low of 520 m to 3 300 m in altitude above sea level, and comprises hill slopes, forest land, agricultural land, streams and rivers. The capital of this district is Kushma Bazaar, lying at the confluence of the Kali Gandaki and Modi rivers. The vegetation in the survey sites included tropical broad leaf (*Shorea robusta*), subtropical species such as pine (*Pinus roxburghii*), and broadleaf vegetation of *Castonopsis indica* and *Schima wallichi*. Timber, fuelwood, round grass, tree fodder and leaf litter are the common forest products used in the region.

Methodology

A three-member field team was selected to test the forestry modules in Parbat district. The team tested the tablet versions of the forestry modules using FAO's Open Foris software. Data were collected from 200 households and 20 community forest groups (selected from the community forest national database available from the District Forest Office ([DFO]) and through discussions with District Forest Officials and Prabat District Federation of Community Forest User Group ([FECOFUN]) Chairperson). The key variable along which communities were selected was the distance of the community forest from a navigable road, and ten community forests near a road head and another ten farther away from a road head were selected for data collection. For the household survey, the team undertook a stratified random sampling of ten households from each community that used the twenty forests selected for the sample. In selecting the households, the team ensured that households represented different groups based on their assets – with rich, medium and poor households comprising the three asset groups.

Following the selection of the twenty community forests (based on the discussions with DFO and FECOFUN) the team approached the chairperson, secretary and other officials of community forest executive committees and held small group meetings of 10–15 people in each location. During the meetings, members of the group were

requested to invite users representing different ethnicities, wealth groups and genders to participate in data collection.

The team did not encounter any difficulties in organizing the small group meetings, and local residents were quite willing to provide the information related to the questions raised. They were also interested in learning about the project from the team. In these group meetings, the team proposed to randomly select ten households according to their wealth ranking for household surveys.

After identifying ten household names, the team approached them to carry out the household survey. In the household surveys the team generally tried to interview the household head and include additional family members during the discussion.

Key observations

Community group meetings usually lasted two hours. Household surveys usually took an hour. When the interview took longer than an hour, it was less likely to retain the attention of the household respondents. Respondents' answers were found to be generally reliable as the survey team also had some sense of the basic parameters of forest user groups and forest use and management from the group discussions that preceded the household interviews.

Uploading and downloading data from a tablet is too complex and needs to be made more transparent and easy. After uploading, it was often difficult to distinguish between new and old data. One possibility would be to colour-mark already uploaded data, or to erase uploaded data so that enumerators know which data have been recorded into the database.

The person supervising data collection should have access to the server in order to monitor data from the base and provide feedback both to enumerators and to the project implementer, especially where mistakes have been made or if additional feedback is to be provided.

Contributed by Birendra Karna

FAO FORESTRY PAPERS

1	Forest utilization contracts on public Land, 1977 (E F S)
2	Planning forest roads and harvesting systems, 1977 (E F S)
3	World list of forestry schools, 1977 (E F S)
3 Rev.1	World list of forestry schools, 1981 (E F S)
3 Rev.2	World list of forestry schools, 1986 (E F S)
4/1	World pulp and paper demand, supply and trade – Vol. 1, 1977 (E F S)
4/2	World pulp and paper demand, supply and trade – Vol. 2, 1977 (E F S)
5	The marketing of tropical wood in South America, 1976 (E S)
6	National parks planning, 1976 (E F S)
7	Forestry for local community development, 1978 (ar E F S)
8	Establishment techniques for forest plantations, 1978 (Ar C E * F S)
9	Wood chips – production, handling, transport, 1976 (C E S)
10/1	Assessment of logging costs from forest inventories in the tropics – 1. Principles and methodology, 1978 (E F S)
10/2	Assessment of logging costs from forest inventories in the tropics – 2. Data collection and calculations, 1978 (E F S)
11	Savanna afforestation in Africa, 1977 (E F)
11	China: forestry support for agriculture, 1978 (E)
12	Forest products prices 1960-1977, 1979 (E F S)
13	Mountain forest roads and harvesting, 1979 (E)
14 Rev.1	Logging and transport in steep terrain, 1985 (e)
15	AGRIS forestry – world catalogue of information and documentation services, 1979 (E F S)
16	China: integrated wood processing industries, 1979 (E F S)
17	Economic analysis of forestry projects, 1979 (E F S)
17 sup.1	Economic analysis of forestry projects: case studies, 1979 (E S)
17 Sup.2	Economic analysis of forestry projects: readings, 1980 (C E)
18	Forest products prices 1960-1978, 1980 (E F S)
19/1	Pulping and paper-making properties of fast-growing plantation wood species – Vol. 1, 1980 (E)
19/2	Pulping and paper-making properties of fast-growing plantation wood species – Vol. 2, 1980 (E)
20	Forest tree improvement, 1985 (C E F S)
20/2	A guide to forest seed handling, 1985 (E S)
21	Impact on soils of fast-growing species in lowland humid tropics, 1980 (E F S)
22/1	Forest volume estimation and yield prediction – Vol. 1. Volume estimation, 1980 (C E F S)
22/2	Forest volume estimation and yield prediction – Vol. 2. Yield prediction, 1980 (C E F S)
23	Forest products prices 1961-1980, 1981 (E F S)
24	Cable logging systems, 1981 (C E)
25	Public forestry administrations in Latin America, 1981 (e)
26	Forestry and rural development, 1981 (E F S)
27	Manual of forest inventory, 1981 (E F)
28	Small and medium sawmills in developing countries, 1981 (E S)
29	World forest products, demand and supply 1990 and 2000, 1982 (E F S)
30	Tropical forest resources, 1982 (E F S)
31	Appropriate technology in forestry, 1982 (E)
32	Classification and definitions of forest products, 1982 (Ar E F S)
33	Logging of mountain forests, 1982 (E F S)
34	Fruit-bearing forest trees, 1982 (E F S)
35	Forestry in China, 1982 (C E)
36	Basic technology in forest operations, 1982 (E F S)
37	Conservation and development of Tropical forest resources, 1982 (E F S)
38	Forest products prices 1962-1981, 1982 (E/F/S)

39 Frame saw manual, 1982 (E)
40 Circular saw manual, 1983 (E)
41 Simple technologies for charcoal making, 1983 (E F S)
42 Fuelwood supplies in the developing countries, 1983 (Ar E F S)
43 Forest revenue systems in developing countries, 1983 (E F S)
44/1 Food and fruit-bearing forest species – 1. Examples from eastern Africa, 1983 (E F S)
44/2 Food and fruit-bearing forest species – 2. Examples from southeastern Asia, 1984 (E F S)
44/3 Food and fruit-bearing forest species – 3. Examples from Latin America, 1986 (E S)
45 Establishing pulp and paper mills, 1983 (E)
46 Forest products prices 1963-1982, 1983 (E/F/S)
47 Technical forestry education – design and implementation, 1984 (E F S)
48 Land evaluation for forestry, 1984 (C E F S)
49 Wood extraction with oxen and agricultural tractors, 1986 (E F S)
50 Changes in shifting cultivation in Africa, 1984 (E F)
50/1 Changes in shifting cultivation in Africa – seven case-studies, 1985 (E)
51/1 Studies on the volume and yield of tropical forest stands – 1. Dry forest formations, 1989 (E F)
52/1 Cost estimating in sawmilling industries: guidelines, 1984 (E)
52/2 Field manual on cost estimation in sawmilling industries, 1985 (E)
53 Intensive multiple-use forest management in Kerala, 1984 (E F S)
54 Planificación del desarrollo forestal, 1984 (S)
55 Intensive multiple-use forest management in the tropics, 1985 (E F S)
56 Breeding poplars for disease resistance, 1985 (E)
57 Coconut wood – Processing and use, 1985 (E S)
58 Sawdoctoring manual, 1985 (E S)
59 The ecological effects of eucalyptus, 1985 (C E F S)
60 Monitoring and evaluation of participatory forestry projects, 1985 (E F S)
61 Forest products prices 1965-1984, 1985 (E F S)
62 World list of institutions engaged in forestry and forest products research, 1985 (E F S)
63 Industrial charcoal making, 1985 (E)
64 Tree growing by rural people, 1985 (Ar E F S)
65 Forest legislation in selected African countries, 1986 (E F)
66 Forestry extension organization, 1986 (C E S)
67 Some medicinal forest plants of Africa and Latin America, 1986 (E)
68 Appropriate forest industries, 1986 (E)
69 Management of forest industries, 1986 (E)
70 Wildland fire management terminology, 1986 (E F S)
71 World compendium of forestry and forest products research institutions, 1986 (E F S)
72 Wood gas as engine fuel, 1986 (E S)
73 Forest products: world outlook projections 1985-2000, 1986 (E F S)
74 Guidelines for forestry information processing, 1986 (E)
75 Monitoring and evaluation of social forestry in India – an operational guide, 1986 (E)
76 Wood preservation manual, 1986 (E)
77 Databook on endangered tree and shrub species and provenances, 1986 (E)
78 Appropriate wood harvesting in plantation forests, 1987 (E)
79 Small-scale forest-based processing enterprises, 1987 (E F S)
80 Forestry extension methods, 1987 (E)
81 Guidelines for forest policy formulation, 1987 (C E)
82 Forest products prices 1967-1986, 1988 (E F S)
83 Trade in forest products: a study of the barriers faced by the developing countries, 1988 (E)
84 Forest products: World outlook projections – Product and country tables 1987-2000, 1988 (E F S)

85 Forestry extension curricula, 1988 (E F S)
86 Forestry policies in Europe, 1988 (E)
87 Small-scale harvesting operations of wood and non-wood forest products involving rural people, 1988 (E F S)
88 Management of tropical moist forests in Africa, 1989 (E F P)
89 Review of forest management systems of tropical Asia, 1989 (E)
90 Forestry and food security, 1989 (Ar E S)
91 Design manual on basic wood harvesting technology, 1989 (E F S) (Published only as FAO Training Series, No. 18)
92 Forestry policies in Europe – An analysis, 1989 (E)
93 Energy conservation in the mechanical forest industries, 1990 (E S)
94 Manual on sawmill operational maintenance, 1990 (E)
95 Forest products prices 1969-1988, 1990 (E F S)
96 Planning and managing forestry research: guidelines for managers, 1990 (E)
97 Non-wood forest products: the way ahead, 1991 (E S)
98 Timber plantations in the humid tropics of Africa, 1993 (E F)
99 Cost control in forest harvesting and road construction, 1992 (E)
100 Introduction to ergonomics in forestry in developing countries, 1992 (E F I)
101 Management and conservation of closed forests in tropical America, 1993 (E F P S)
102 Research management in forestry, 1992 (E F S)
103 Mixed and pure forest plantations in the tropics and subtropics, 1992 (E F S)
104 Forest products prices 1971-1990, 1992 (E F S)
105 Compendium of pulp and paper training and research institutions, 1992 (E)
106 Economic assessment of forestry project impacts, 1992 (E F)
107 Conservation of genetic resources in tropical forest management – Principles and concepts, 1993 (E F S)
108 A decade of wood energy activities within the Nairobi Programme of Action, 1993 (E)
109 Directory of forestry research organizations, 1993 (E)
110 Proceedings of the Meeting of Experts on Forestry Research, 1993 (E F S)
111 Forestry policies in the Near East region – analysis and synthesis, 1993 (E)
112 Forest resources assessment 1990 – tropical countries, 1993 (E)
113 Ex situ storage of seeds, pollen and in vitro cultures of perennial woody plant species, 1993 (E)
114 Assessing forestry project impacts: issues and strategies, 1993 (E F S)
115 Forestry policies of selected countries in Asia and the Pacific, 1993 (E)
116 Les panneaux à base de bois, 1993 (F)
117 Mangrove forest management guidelines, 1994 (E)
118 Biotechnology in forest tree improvement, 1994 (E)
119 Numéro non assigné
120 Decline and dieback of trees and forests – a global overview, 1994 (E)
121 Ecology and rural education – Manual for rural teachers, 1995 (E S)
122 Readings in sustainable forest management, 1994 (E F S)
123 Forestry education – New trends and prospects, 1994 (E F S)
124 Forest resources assessment 1990 – Global synthesis, 1995 (E F S)
125 Forest products prices 1973-1992, 1995 (E F S)
126 Climate change, forests and forest management – An overview, 1995 (E F S)
127 Valuing forests: context, issues and guidelines, 1995 (E F S)
128 Forest resources assessment 1990 – Tropical forest plantation resources, 1995 (E)
129 Environmental impact assessment and environmental auditing in the pulp and paper industry, 1996 (E)
130 Forest resources assessment 1990 – Survey of tropical forest cover and study of change processes, 1996 (E)

131 Ecología y enseñanza rural – Nociones ambientales básicas para profesores rurales y extensionistas, 1996 (S)
132 Forestry policies of selected countries in Africa, 1996 (E F)
133 Forest codes of practice – Contributing to environmentally sound forest operations, 1996 (E)
134 Estimating biomass and biomass change of tropical forests – A primer, 1997 (E)
135 Guidelines for the management of tropical forests – 1. The production of wood, 1998 (E S)
136 Managing forests as common property, 1998 (E)
137/1 Forestry policies in the Caribbean – Volume 1: Proceedings of the expert consultation, 1998 (E)
137/2 Forestry policies in the Caribbean – Volume 2: Reports of 28 selected countries and territories, 1998 (E)
138 Fao Meeting on Public Policies Affecting Forest Fires, 2001 (E F S)
139 Governance principles for concessions and contacts in public forests, 2003 (E F S)
140 Global Forest Resources Assessment 2000 – Main report, 2002 (E F S)
141 Forestry Outlook Study for Africa – Regional report: opportunities and challenges towards 2020, 2003 (Ar E F)
142 Cross-sectoral policy impacts between forestry and other sectors, 2003 (E F S)
143 Sustainable management of tropical forests in Central Africa – In search of excellence, 2003 (E F)
144 Climate change and the forest sector – Possible national and subnational legislation, 2004 (E)
145 Best practices for improving law compliance in the forest sector, 2005 (E F R S)
146 Microfinance and forest-based smallscale enterprises, 2005 (Ar E F S)
147 Global Forest Resources Assessment 2005 – Progress towards sustainable forest management, 2006 (E F S)
148 Tendencias y perspectivas del sector forestal en América Latina y el Caribe, 2006 (S)
149 Better forestry, less poverty – a practitioner's guide, 2006 (Ar E F S)
150 The new generation of watershed management programmes and projects, 2006 (E F S)
151 Fire management – Global assessment 2006, 2007 (E)
152 People, forests and trees in West and Central Asia – Outlook for 2020, 2007 (Ar E R)
153 The world's mangroves 1980–2005, 2007 (E)
154 Forests and energy – Key issues, 2008 (Ar C E F R S)
155 Forests and water, 2008 (E F S)
156 Global review of forest pests and diseases, 2009 (E)
157 Human-wildlife conflict in Africa – Causes, consequences and management strategies, 2009 (E F)
158 Fighting sand encroachment – Lessons from Mauritania, 2010 (E F)
159 Impact of the global forest industry on atmospheric greenhouse gases, 2010 (E)
160 Criteria and indicators for sustainable woodfuels, 2010 (E)
161 Developing effective forest policy – A guide, 2010 (E F S)
162 What woodfuels can do to mitigate climate change, 2010 (E)
163 Global Forest Resources Assessment 2010 - Main report (Ar C E F R S)
164 Guide to implementation of phytosanitary standards in forestry, 2011 (C E F R)
165 Reforming forest tenure – Issues, principles and process, 2011 (E S)
166 Community-based fire management – a review (E)
167 Wildlife in a changing climate (E)
168 Soil carbon monitoring using surveys and modelling – (E)
169 Global forest land-use change 1990–2005 (E F S)
170 Sustainable management of Pinus radiata plantations (E)
171 Edible insects – Future prospects for food and feed security (E F)
172 Climate change guidelines for forest managers (E F S)
173 Multiple-use forest management in the humid tropics (E S)
174 Towards effective national forest funds, 2015 (E)

175 Global guidelines for the restoration of degraded forests and landscapes in drylands – Building resilience and bene ting livelihoods, 2015 (E)

176 Forty years of community-based forestry – A review of its extent and effectiveness, 2016 (E)

177 Forestry for a low-carbon future – Integrating forests and wood products in climate change strategies, 2016 (E)

178 Guidelines on urban and peri-urban forestry, 2016 (E)

Ar – Arabic
C – Chinese
E – English
I – Italian
F – French
K – Korean
P – Portuguese
S – Spanish
R – Russian
M – Multilingual
* – Out of print

FAO Forestry Papers are available through the authorized FAO Sales agents or directly from Sales and Marketing Group, FAO, Viale delle terme di Caracalla, 00153 Rome, Italy, or at www.fao.org/forestry/58718/en/

179
FAO FORESTRY PAPER

National socioeconomic surveys in forestry

Guidance and survey modules for measuring the multiple roles of forests in household welfare and livelihoods

Adequate information on the socioeconomic contributions of forests to household welfare, livelihoods and poverty reduction is key to national sustainable development in the post-2015 agenda. While awareness is growing regarding the multiple roles of forests in these aspects of sustainable development, the lack of systematic data in many countries limits an evidence-based demonstration of this. Lacking reliable information, forests and forestry are not always adequately considered in the development of national policies. This sourcebook is intended to help improve data collection on aspects of forests relating to household welfare and livelihoods. It offers practical guidance and measurement tools that can be included in existing social or socioeconomic surveys undertaken by a country's national statistical office, or in independent national surveys.

ISBN 978-92-5-109438-9 ISSN 0258-6150

9 789251 094389

I6206EN/2/07.19